STANFORD BULLETIN

2008-09

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STANFORD UNIVERSITY

The *Stanford Bulletin* is a 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

The Stanford Bulletin may be purchased from the Stanford Bookstore. To receive the Bulletin via UPS Ground (U.S. only), send a check or money order to the address below that includes $8.00 for the Bulletin and $5.95 for shipping and your respective state's sales tax. California residents send a check or money order for $14.61 (includes state sales tax). For international and credit card purchases, call (800) 533-2670 or go to http://stanfordbookstore.com, click on the "Apparel and Gifts" link in the left hand red speed bar, then click on "Gifts & Accessories", then click on "Books & Publications". Prices are subject to change. Check or money order in U.S. funds, payable to Stanford Bookstore.

Stanford Bookstore
519 Lasuen Mall
Stanford, California 94305-3079

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

Editor: Stephen Arod Shirreffs
Editorial Assistant: Philip Lorenz
Special Editorial Assistance: Lindi Press
Cover Design: Stanford Design Group
Cover Photos: Matthew Vierling

Cover Photos: Historical night photos of White Plaza and "The Claw" as Stanford prepares to unveil the newly renovated White Plaza.

ACADEMIC CALENDAR 2008-09

For the complete academic calendar, see http://registrar.stanford.edu/academic_calendar.

		AUTUMN QUARTER
Sep	12 (Fri)	Course enrollment deadline to receive stipend or refund check on first day of term
	16 (Tue)	New undergraduates arrive; Convocation
	22 (Mon)	First day of quarter; instruction begins; last day to file Leave of Absence; last day to receive full refund for Autumn Quarter
	25 (Thu)	Conferral of degrees, Summer Quarter
Oct	5 (Sun)	Study list deadline
	12 (Sun)	Add deadline (courses or units)
	19 (Sun)	Drop deadline (courses or units); last day for tuition reassessment for dropped courses or units
Nov	2 (Sun)	Change of grading basis deadline
	9 (Sun)	Term withdrawal deadline; last day to withdraw from the University with a partial refund
	16 (Sun)	Course withdrawal deadline; application deadline for Autumn Quarter degree conferral
	24-28 (Mon-Fri)	Thanksgiving recess *(holiday, no classes)*
	30- Dec 6 (Sun-Sat)	Last opportunity to arrange Incomplete in a course, at last class
Dec	1-7 (Mon-Sun)	End-Quarter Period
	5 (Fri)	Last day of classes (unless class meets on Saturday)
	8-12 (Mon-Fri)	End-Quarter examinations
	12 (Fri)	Last day to submit University thesis, D.M.A. final project, or Ph.D. dissertation
		WINTER QUARTER
Dec	12 (Fri)	Course enrollment deadline to receive stipend or refund check on first day of term
Jan	5 (Mon)	Last day to file Leave of Absence; last day to receive full refund for Winter Quarter
	6 (Tue)	First day of quarter; instruction begins
	8 (Thu)	Conferral of degrees, Autumn Quarter
	19 (Mon)	Martin Luther King, Jr., Day *(holiday, no classes)*
	19 (Mon)	Study list deadline
	25 (Sun)	Add deadline (courses or units)
Feb	1 (Sun)	Drop deadline (courses or units); last day for tuition reassessment for dropped courses or units
	16 (Mon)	Presidents' Day *(holiday, no classes except Law);* change of grading basis deadline
	18 (Wed)	Term withdrawal deadline; last day to withdraw from the University with a partial refund
Mar	1 (Sun)	Course withdrawal deadline; application deadline for Winter Quarter degree conferral
	8-14 (Sun-Sat)	Last opportunity to arrange Incomplete in a course, at last class
	9-15 (Mon-Sun)	End-Quarter Period
	13 (Fri)	Last day of classes (unless class meets Saturday)
	16-20 (Mon-Fri)	End-Quarter examinations
	20 (Fri)	Last day to submit University thesis, D.M.A. final project, or Ph.D. dissertation
		SPRING QUARTER
Mar	20 (Fri)	Course enrollment deadline to receive stipend or refund check on first day of term
	30 (Mon)	Last day to file Leave of Absence; last day to receive full refund for Spring Quarter
	31 (Tue)	First day of quarter; instruction begins
Apr	2 (Thu)	Conferral of degrees, Winter Quarter
	12 (Sun)	Study list deadline; application deadline for Spring Quarter degree conferral
	14 (Tue)	Matriculated undergraduate financial aid application, deadline to file
	19 (Sun)	Add deadline (courses or units)
	26 (Sun)	Drop deadline (courses or units); last day for tuition reassessment for dropped courses or units
May	10 (Sun)	Change of grading basis deadline
	12 (Tue)	Term withdrawal deadline; last day to withdraw from the University with a partial refund
	25 (Mon)	Memorial Day *(holiday, no classes);* course withdrawal deadline
	28-June 3 (Thu-Wed)	Last opportunity to arrange Incomplete in a course, at last class
	29-June 4 (Fri-Thu)	End-Quarter Period
June	3 (Wed)	Last day of classes
	4 (Thu)	Day before finals, no classes
	5 (Fri)	Last day to submit University thesis, D.M.A. final project, or Ph.D. dissertation
	5-10 (Fri-Wed)	End-Quarter examinations
	13 (Sat)	Senior Class Day; Baccalaureate Saturday
	14 (Sun)	Commencement
		SUMMER QUARTER
June	12 (Fri)	Course enrollment deadline to receive stipend or refund check on first day of term
	22 (Mon)	Last day to file Leave of Absence; last day to receive full refund for Summer Quarter
	23 (Tue)	First day of quarter; instruction begins
	28 (Sun)	Study list deadline
July	3 (Fri)	Independence Day observed *(holiday, no classes)*
	5 (Sun)	Add deadline (courses or units)
	12 (Sun)	Drop deadline (courses or units); last day for tuition reassessment for dropped courses or units
	24 (Fri)	Term withdrawal deadline; last day to withdraw from the University with a partial refund for 8- and 10-week sessions
	26 (Sun)	Change of grading basis deadline
Aug	2 (Sun)	Course withdrawal deadline; application deadline for Summer Quarter degree conferral
	7-13 (Fri-Thu)	Last opportunity to arrange Incomplete in a course, at last class
	8-13 (Sat-Thu)	End-Quarter Period
	13 (Thu)	Last day of classes
	14-15 (Fri-Sat)	End-Quarter examinations
	18 (Fri)	Last day to submit University thesis, D.M.A. final project, or Ph.D. dissertation

Contents

Editor's Note: The organization of the contents of the Stanford Bulletin 2008-09 differs from previous years. Degree requirement sections are listed alphabetically by school, and then alphabetically by department or program, beginning on page 56. Courses are listed alphabetically by subject name starting on page 328. These changes were made to facilitate the simultaneous release of a web site at http://bulletin.stanford.edu which readers are advised to consult for changes after the bulletin went to press.

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WELCOME TO STANFORD

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 an hour's drive 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 Iris and B. Gerald Cantor Center for Visual Arts at Stanford University 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 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, human development, 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 Stanford Linear Accelerator Center; 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 students 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 1,800, is one of the most distinguished in the nation. It includes 16 Nobel laureates, 4 Pulitzer Prize winners, 20 National Medal of Science winners, 132 members of the National Academy of Sciences, 239 members of the American Academy of Arts and Sciences, 85 members of the National Academy of Engineering, and 28 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 2007 totaled 14,945, of whom 6,759 were undergraduates and 8,186 were graduate students. Like the faculty, the Stanford student body is distinguished. Approximately 12 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 2000 was 95 percent. Stanford awarded 4,666 degrees in 2007-08, of which 1,702 were baccalaureate and 2,964 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 95 NCAA team titles, 79 have been captured since 1980, placing Stanford at the top among the nation's most title-winning schools during that time. In 2007-08, Stanford won two national championships in women's cross country and women's synchronized swimming, and won the Directors' Cup, emblematic of the top overall athletic program in the country, for the 14th consecutive year. 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, 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."

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ORGANIZATION

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.

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 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 Stanford Linear Accelerator Center, and Vice President for Land, Buildings, and Real Estate.

COMMITTEES AND PANELS

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 (AP-IRL)
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 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-070
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, School of Law, School of Medicine.

The deans of the schools report to the Provost.

THE ACADEMIC COUNCIL

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; and (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

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

UNDERGRADUATE ADMISSION

MATRICULATED STUDY (UNDERGRADUATE)

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. 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 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. 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.

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 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 in the *Guide to Graduate Admission* or 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 and in the *Guide to Graduate Admission*.

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 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.

The *Guide to Graduate Admission* may be obtained from Graduate Admissions, Office of the University Registrar, 630 Serra Street, Suite 120, Stanford University, Stanford, California 94305-6032; the Guide outlines application policies except for the programs listed following this paragraph. Applicants who are unable to apply online may send a written request for a paper admissions packet from Graduate Admissions, Office of the University Registrar, 630 Serra Street, Suite 120, Stanford University, Stanford, CA 94305-6032. The cost for this packet is $20. For admission to the following programs, apply directly at the address listed.

Business—Applicants should write to Director of Admissions of the M.B.A., Ph.D., or Sloan program, Graduate School of Business, Stanford University, Stanford, CA 94305-5015 for information and application forms.

Law—Applicants should write to 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://www.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 under "Coterminal Degree Program" in the "Matriculated Study" section of this bulletin..

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 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. 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. 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.htm. 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.

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://www.stanford.edu/dept/icenter.

RESCISSION, HOLDS, AND DEGREE CONFERRAL

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) 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 matriculation 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 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 (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.

FINANCIAL AID

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, 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 $4,500 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.

UNDERGRADUATE FINANCIAL AID APPLICATION AND AWARD NOTIFICATION PROCESS

FINANCIAL AID PRIORITY FILING DEADLINES

Prospective freshmen	Restrictive Early Action, November 15, 2008
Prospective freshmen	Regular Decision, February 15, 2009
Prospective transfers	March 15, 2009
Returning students	April 15, 2009

APPLICANT DOCUMENTS

U.S. citizens and U.S. 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. 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, 2009, for Cal Grant consideration.
2. CSS PROFILE application: file online at http://profileonline.collegeboard.com
3. Copies of parents' 2008 W-2 forms. Continuing students should submit copies directly to the FAO. New applicants should submit signed copies of their parents' 2008 federal tax returns and W-2 forms to the CSS IDOC service.

U.S. citizens and U.S. 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.

International students (except Canadians) should complete and submit the International Student Financial Aid Application and Certification of Finances directly to the FAO. Canadians should file the CSS PROFILE and submit tax documents as listed above.

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 begins sending award notices to continuing and returning applicants in early August. 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 OPTIONSThe federal Parent Loan for Undergraduate Students (PLUS) program is available to help parents cover all or part of the expected family through a low-interest, long-term loan. PLUS loans are 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 that 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 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 (888) 326-3773 or (650) 723-3058. Students who are not U.S. citizens or U.S. 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.
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 is 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 Student Financial Services. Cash advances may not be used to pay University bills.

COTERMINAL STUDENT FINANCIAL AID

Coterminal students, who are concurrently pursuing bachelor's and masters 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.

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.

VETERANS' EDUCATIONAL BENEFITS

Liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans' educational benefits is provided by the Office of the University Registrar. All students eligible to receive veterans' educational benefits while attending the University are urged to complete arrangements with the appropriate agency well in advance of enrollment. In addition, 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 Administration (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 again 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.

TUITION AND FEES

TUITION

Regular tuition for the 2008-09 academic year, payable Autumn, Winter, and Spring quarters, is as follows:

All departments and schools (except those below)	$12,010
Graduate Division in Engineering	$12,800
Graduate School of Business, first year	$16,307
Graduate School of Business, second year	$15,307
School of Medicine (M.D. Program)	$14,463
School of Law (payable Autumn and Winter semesters)	$20,440
J.D./M.B.A. Program (payable Autumn and Winter semesters)	$21,462

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

Regular tuition fees apply to the undergraduate Overseas Studies and Stanford in Washington programs. For Summer Quarter tuition rates and policies, see http://registrar.stanford.edu/students/finances/summer.htm or the Summer Quarter *Time Schedule*.

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 or the Summer Quarter Time Schedule.

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 or clearing incompletes in their terminal quarter, or requiring a registration status, and who meet the PSO conditions listed in the "Special Registration Statuses" section of this Bulletin, may petition for PSO status for up to two quarters. The PSO rate is $3012 per quarter in 2008-09.
2. *13th Quarter*—Undergraduates who meet the 13th Quarter conditions listed in the "Special Registration Statuses" 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. Undergraduate students who have completed all University requirements and meet the Graduation Quarter conditions listed in the "Special Registration Statuses" 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.

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 8-, 9-, or 10-unit rate if their enrollment plans are accepted by their departments. Students in the schools of Law and Business, or the M.D. program in the School of Medicine, should consult appropriate school officers about tuition reduction eligibility.

Matriculated graduate students who have Stanford fellowships or assistantships that require less than full-tuition registration may register at the unit rate required by their award. Honors Cooperative students register at the 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 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: $2,760 per quarter in 2008-09. 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 only a few 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. 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.

FEES

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 2008-09 fees are:

Undergraduates—$110 per quarter
Graduate Students—$30 per quarter
Law Students—Autumn, $30; Winter, $60

Fees are assessed each term. All fees are refundable. Refunds can be requested during the first three weeks of each quarter on the ASSU web site at http://assu.stanford.edu. Those eligible are mailed refund checks by the eighth week of the quarter.

DOCUMENT FEE

Stanford charges a one-time Document Fee to all students admitted to new degree or non-degree programs in 1993 or later. 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.

HEALTH INSURANCE FEE

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 second day of instruction. See http://vaden.stanford.edu/insurance/using_your_own.html#waive for details. Those who carry medical insurance through an alternate carrier are generally eligible for waiver of the health insurance fee.

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 semester 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 copyrights.

Late Fees—Charges are imposed for late submission of study lists. The amount is listed in the quarterly Time Schedule.

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 is 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.

HOUSING

Bulletins with further information on housing rates are *School of Law* for Law School and *Overseas Studies* for Overseas Centers. See http://summer.stanford.edu for Summer Session rates.

Campus housing rates are generally below local area market rents. The approximate room rates for the 2008-09 academic year are as follows:

Residences			*Room Rates**	
	Aut	*Win*	*Spr*	*Total*
Undergraduate Single Student Residences:				
Residence Halls and University-operated houses	$2,269	1,979	1,952	6,200
Theme or self-operated houses (includes kitchen fee)	2,817	2,374	2,342	7,533
Theme or self-operated houses (excludes kitchen fee)	2,348	1,979	1,952	6,278
Theme house, non-Row (EAST)	2,722	2,374	2,342	7,438
Co-ops, Fraternity, Sorority, or student-cleaned houses with professional cooks (includes kitchen fee - DDD, Durand, Grove, Phi Sig)	2,514	2,119	2,091	6,724
Co-ops, Fraternity, Sorority, or student-cleaned houses with professional cooks (excludes kitchen fee - EBF)	2,045	1,724	1,701	5,469
Mirrielees (apartments)	2,565	2,237	2,207	7,008
Suites	2,537	2,213	2,183	6,933
Crothers (Autumn only)	2,269			2,269
Graduate Single Student Residences:				
Dormitories (single occupancy)				$677 per month
Dormitories (double occupancy)				$478 per month
Rains Houses (apartments)				$835 per month
Richard W. Lyman (apartments)				$835 per month
Schwab Residential Center (apartments)				$1,277per month
Escondido Village (single student apartments):				
Studio (single occupancy)				$1,051 per month
1 bedroom (single occupancy				$1,412 per month
1 bedroom (double occupancy)				$567 per month
2 bedroom (double occupancy)				$835 per month
2 bedroom (triple occupancy)				$567 per month
3 bedroom (triple occupancy)				$755 per month
Couples without Children:				
Escondido Village				
1 bedroom				$1,412 per month
1 bedroom plus den				$1,606 per month
Students with Children:				
Escondido Village				
1 bedroom				$1,359 per month
2 bedroom				$1,556 per month
3 bedroom				$1,881 per month
4 bedroom				$2,232 per month

* All rates are approximate and subject to change.

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 Financial Services office, 632 Serra Street, Suite 150, 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.

MEAL PLANS

Stanford'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 University-managed housing with an attached Stanford Dining facility (Branner, Florence Moore, Lakeside, Manzanita, Murray, Ricker, Stern, Wilbur, and Yost) are required to participate in a meal plan. Stanford Dining is committed to providing Meal Plans that offer maximum flexibility of dining locations across campus.

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

There are three standard meal plans available: 19 meals/week; 14 meals/week plus meal plan Cardinal Dollars; and 10 meals/week plus meal plan Cardinal Dollars. The 10 meals/week plan allows for one roll-over meal per week; the 14 meals/week plan allows two roll-over meals per week. The 19 meals/week plan now includes an additional three guest meals per quarter, for a total of eight guest meals per quarter; the 14 meal/week and 10 meal/week plans continue to provide five guest meals per quarter. The 10 meal plan allows one roll-over meal to be carried over to a following week, allowing for a maximum of 11 meals in a given week. With the 14 meal plan, up to two roll-over meals may carry over to following weeks, for a maximum of 16 all-you-care-to-eat meals in any one week. Roll-over meals carry over from week to week until the extra meal is used, or until the end of the meal plan quarter.

	Aut	*Win*	*Spr*	*Total*
Total Meal Plan Cost	$1,809	$1,618	$1,555	$4,982
Meal Plan Cardinal Dollars				
14 Meals/week	155	135	130	420
10 Meals/week	270	245	235	750
Yost/Murray: 11 meals/week and Open Kitchen	125	115	105	345

19 Meals/week Meal Plan—Students on this meal plan are able to partake of every meal that Stanford Dining serves. Students enter the dining hall and swipe their ID cards once. During this visit, they may make unlimited trips through the food service lines, and eat as much as they want. This plan offers 8 bonus guest meals per quarter.

14 Meals/week plus Meal Plan Cardinal Dollars—Students begin each week on Sunday with 14 all-you-care-to-eat meals available to them. Each quarter, a set amount of Cardinal Dollars is added to a student's ID card. Two unused meals may be rolled over into the following weeks for a maximum of 16 meals per week.

10 Meals/week plus Meal Plan Cardinal Dollars—Students begin each week on Sunday with 10 all-you-care-to-eat meals available to them. Each quarter, a set amount of Cardinal Dollars is added to a student's ID card. One unused meal may be rolled over into the following weeks for a maximum of 11 meals per week.

Open Kitchen—Yost and Murray residents have 10 meals/week cooked and served in their house, one meal that can be used in another dining hall, and each resident is given a set amount of

Cardinal Dollars each quarter. Each house also has a discretionary budget to purchase snacks or other food items as agreed upon by the house, available to residents in the open kitchen. Students at Yost and Murray houses are responsible for the cleanliness of the kitchens outside Stanford Dining's hours of operation.

CARDINAL DOLLARS

A maximum of 75 unused meal plan Cardinal Dollars carry over to the next quarter. Cardinal Dollars are not available for use during the period between quarters. These Cardinal Dollars expire on the last day of Spring Quarter when the meal plan ends. Cardinal Dollars can be used in all of Stanford Dining's locations.

Cardinal Dollars may also be added to a Stanford ID card and can be used in any Stanford Dining location, all residence dining halls to purchase meals, and in Stanford Dining's cafés and late night locations including: Subway, Pizza Hut, and Union Square at Tresidder; Olives at Building 160; the Café at the Alumni Center; Late Night at Lakeside, Stern's Cyber Café, and Wilbur's Energy Zone. Cardinal Dollars that are purchased in addition to a meal plan carry over from quarter to quarter, and from year to year.

Enrolled students can purchase Cardinal Dollars by logging into their account using the Manage Your Account option. Online orders are charged to the University bill. Students can also submit an order via email from the student's SUNet account to diningplans@stanford.edu; students must include a SUNet ID number and the amount being purchased. Email orders are billed to the University bill. Anyone with a Stanford ID may purchase Cardinal Dollars with cash, check, or credit card at Stanford Dining's customer service office on the second floor of Tresidder Memorial Union, Suite 5, off the Meeting Services lobby. The office is open Monday to Friday, 9 a.m. to 5 pm. For additional information, see http://dining.stanford.edu, email diningplans@stanford.edu, or phone at 650-723-4751.

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.

All 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. Students may view their account online 24 hours a day, seven days a week, via Stanford ePay at http://axess.stanford.edu. Payments can be made online through Stanford ePay or the bill and a payment stub may be printed.

Term fees, such as tuition, fees, room, board, and health insurance, are due and must be received on 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, and other miscellaneous fees, are due after they are billed.

Fees may be paid: via Stanford ePay (preferred); by mail at 632 Serra Street, Room 150, Stanford, CA 94309-6036; in person at the Cashier's Office, Maude Modular, 632 Serra Street, Room 150; or at the 24-hour secure drop box on the wall outside the staff entrance to Maude. The Cashier's Office is open from 9:00 a.m. to 5:00 p.m., Monday through Friday, excluding University holidays. Payments received in the drop box after 5:00 p.m. are processed the following business day.

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

ACCOUNT PENALTIES

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 is 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.

FORMS OF PAYMENT

The preferred method of payment is electronic check (eCheck) using the online service, Stanford ePay. Stanford ePay accepts eCheck or credit cards (American Express, Discover, MasterCard). There is no fee associated with eCheck; however, a non-refundable convenience fee of 2.75 percent applies to credit card payments. In addition to Stanford ePay, Stanford accepts the following forms of payment: 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 postdated checks.

REFUNDS

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

ANNULLED REGISTRATION

Students who take a leave of absence 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 receive refunds on the same basis as those receiving leaves of absence unless otherwise specified in the disciplinary action taken. 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 do everything reasonably possible to avoid 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 possible 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 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, may file a petition for a leave of absence and tuition refund with the Office of the University Registrar. A leave of absence after the first 60 percent of the quarter 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 page the "Leaves of Absence and Reinstatement (Graduate)" section of this bulletin.

TUITION REFUND SCHEDULE

Students who take an approved leave of absence are eligible for a tuition refund during the first 60 percent of the quarter. 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. After the first 60 percent of the quarter, 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	$146.46	$162.30	$166.81	$222.41
Graduate 8-9-10 Unit Rate	$95.24	$105.54	$108.47	$144.63
Graduate Engr. Full Tuition	$156.10	$172.97	$177.78	$237.04
Graduate Engr. 8-9-10 Unit Rate	$101.46	$112.43	$115.56	$154.07
Last Date for Tuition Refund	Nov. 9	Feb. 18	May 12	July 24

For example: an undergraduate, who was charged the tuition rate of $12,010 for Autumn Quarter, becomes ill and informs the Registrar's Office 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 $141.46 per day) or $1,414.60.

Separate schedules exist for students paying the medical, law, graduate business, or summer session rates. These schedules are available at the Office of the University Registrar or at http://registrar.stanford.edu/students/finances.

Tuition refunds are calculated based on the date that the student last attended classes.

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 or on Axess. 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), in person at Student Financial Services (Maude Modular, 632 Serra Street), or by phone at (650) 723-2181. Student Financial Services office hours are Monday through Friday, 8 a.m. to 5 p.m., except University holidays.

A student can receive a refund by direct deposit. Students are advised to maintain up-to-date direct deposit details in Axess. 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.

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 Student Financial Services.

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://housing.stanford.edu/resagree/0708/.

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.

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 by residence deans. In addition, Residential Education is responsible for administration of local undergraduate residence offices.

UNDERGRADUATE RESIDENCES

Assignment to 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. Undergraduates are guaranteed four years of housing.

Residence assignments for continuing undergraduates are made on the basis of an annual lottery, called the Draw, and quarterly waiting lists. Undergraduates who enter Stanford as freshmen are guaranteed four years of University housing if they apply by the appropriate Draw deadlines and are willing to live anywhere on campus. Transfer students are guaranteed two or three years of housing, based on their entering class standing.

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

Assignment to Graduate Residences—Over 53 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 housing if they apply by the first round application deadline for the Autumn term and 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. Additional housing is under construction to better meet demand.

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.

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 Autumn 2001 and thereafter*—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.
5. *Students admitted as freshmen prior to Autumn 2001 and 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 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" section below.)

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 Writing, General Education, and Language requirements.
3. 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).
4. *Students admitted as freshmen Autumn Quarter 2001 and thereafter*—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.
5. *Students admitted as freshmen prior to Autumn Quarter 2001 and 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 may determine 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 University Registrar's Degree Progress section 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.

Conferral of each degree is applied for separately by the deadlines given in the Academic Calendar at http://registrar.stanford.edu/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 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 Office of the University Registrar. 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 within the Undergraduate Progress function or by checking with the Office of the University Registrar. 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 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 Office of the University Registrar. 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 External Credit Evaluation staff determines, after appropriate faculty consultation, whether the work is comparable to any of the specifically certified courses or course sequences.

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 advised at the time of matriculation by the Office of the University Registrar's External Credit Evaluation 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 External Credit Evaluation 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's External Credit Evaluation section for this purpose.

A complete listing of PWR 1 courses is available each quarter at http://ual.stanford.edu/AP/univ_req/PWR/Courses.html, and at the PWR office in Building 460, Room 223. 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.

LANGUAGE REQUIREMENT

To fulfill the Language Requirement, undergraduates who entered Stanford in Autumn 1996 and thereafter 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.

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. Students may not enroll in courses at Stanford for which they received equivalent credit through the AP program. The chart below shows the current AP credit and placement policies. Further information is available from the Office of the University Registrar's External Credit Evaluation section.

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.

AP SCORES AND PLACEMENT

Test Subject	*Score*	*Placement*	*Quarter Units*
Chemistry	5	CHEM 31X or above	4
Chinese (Language and Culture)[1]	5	Take placement exam if continuing in this language	10
Computer Science AB	4,5	CS 106B, 106X, or 107	5
Computer Science A	4,5	CS 106B or 106X	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
Math AB	5	MATH 51	10
	4	MATH 42	5
Math BC	4,5	MATH 51	10
	3	MATH 42	5
Math AB subscore	5	MATH 51	10
	4	MATH 42	5
Physics B	5	PHYSICS 25	8
	4	PHYSICS 23 and 25	4
Physics C (2 parts)			
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 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 who entered Autumn 1996 and thereafter, 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

For undergraduates who entered Autumn 1996 and thereafter, 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. For those who entered Stanford as transfer students in Autumn 1996 and thereafter, the maximum 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 applicable to undergraduate students who entered Stanford in Autumn 1996 and thereafter. 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.

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 courses at Stanford, again, subject to the approval of the credit evaluator as to quality and suitability.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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 request the status and to request pre-approval of the transfer work. A registration status is required to graduate; therefore, a Petition for Graduation Quarter should be submitted along with the Request for Last Units Out of Residence, and 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 undergraduate students 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 consult with Transfer/External Credit Evaluation (630 Serra Street, Suite 120) if planning to transfer the work back to Stanford. Consultations should be completed 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 Office of the University Registrar.

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.

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	76-107	29	105-136	internship,senior seminar	EARTHSYS 195
Energy Resources Engineering	83-90	36	119-126		ENERGY 199
Geological & Environmental Sciences	31-45	40-56	68-90	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					
Atmosphere/Energy	50	51-53	101-103		STS 110
Aeronautics and Astronautics	56-58	39	95-97		AA 190
Architectural Design	40	60	100		CEE 100
Biomechanical Engineering	42-63	49-64	103-116		BIO 44X
Biomedical Computation	51-65	47-56	109-114		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	50-59	46-58	96-117		EE 108A/ENGR 102E,M, ME 203, 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
Material Science and Engineering	53-59	50	103-109		MATSCI 161, 164
Mechanical Engineering	61-65	45	106-110		ENGR 102M and ME 203
Product Design	58-59	48	106-107		ENGR 102M, ME 203
School of Humanities and Sciences					
African and African American Studies	50	10	60	CSRE senior sem.	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,90B,90C
Archaeology	45	20	65	ARCHLGY 103	
Art				ARTHIST 1	
Art History	-	56	56	library orientation, junior seminar	
Film and Media Studies	8	65	65	library orientation, senior seminar	FILMSTUD 102
Studio Art	-	64	64	library orientation, advanced seminar	
Asian American Studies	55	5	60	CSRE senior sem.	See CSRE
Asian Languages					
Chinese	0-16	27-43	min. 43		CHINGEN 133
Japanese	0-20	23-43	min. 43		JAPANGEN 138
Biology	46-56	47-48	93-104		BIO 44X,44Y,145,185; BIOHOPK 44Y, 165H, 175H, 188H
Chemistry	34	52	86		CHEM 134
Chicana/o Studies	55	5	60	CSRE senior sem.	See CSRE
Classics	-	-	60-65		CLASSGEN 176
Communication	5	min. 60	65		COMM 120
Comparative Literature	-	min. 37	65	Gateway course: 101 Core: 121, 122, 123 Capstone course: 199 3 electives in COMPLIT	COMPLIT 101

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
Comparative Studies in Race & Ethnicity	55	5	60	CSRE senior sem.	CSRE 200X
Drama	-	60	60		DRAMA 161R
East Asian Studies	75	1	75	seminar overseas studies; E. Asian country 1 quarter; senior essay	CHINGEN 133; JAPANGEN 138; HISTORY 256
Economics	-	80	80	-	ECON 101
English		60	60		ENGLISH 160
w/ Creative Writing		65	65	dept. approval	
w/ Interdisciplinary Emphasis	20	50	70	dept. approval and interdisciplinary paper	
w/ Interdepartmental Emphasis	20	45	65	20 units in foreign lang. lit.; dept. approval	
w/ Philosophy	30	40	70		
Feminist Studies	45	18 core	63	focus statement; practicum	FEMST 253
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. 13	min. 39	min. 84	Internship	HUMBIO 4B
Interdisciplinary Studies in Humanities	approx. 60	28 (honors)	approx. 88	honors required with major	HUMNTIES 200A,B,C
Option for Premeds	approx. 110 (incl. premed requirements)	28 (honors)	approx. 138	honors required with major	HUMNTIES 200A,B,C
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. @ 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 & ear-training exam	2 from: MUSIC 140-145, 148, 149, 151
Music, Science, and Technology	-	66	66-76	piano-proficiency & ear-training exam	MUSIC 151
Native American Studies	55	5	60	CSRE Senior Sem.	See CSRE
Philosophy	-	55	55	course in 194 series	PHIL 80
Philosophy & Literature	min. 15	min. 47	65	Gateway course; 194	
Philosophy and Religious Studies	-	60	60	3 seminars; 20 units in each dept. + 20 advanced units from both depts.	PHIL 80 or RELIGST 290
Physics	18-21	56-61	77-79		PHYSICS 107
Political Science	0-10	60-70	70		POLISCI 110C,D,120C, 124R, 215,247R
Psychology	10	60	70		PSYCH 55,70,75,110
Public Policy	59	28	87	min. 15 concentration units; Senior Seminar	PUBLPOL 106

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
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	-	50-65	65		SOC 200, 202
Spanish and Portuguese		26	56	Core courses	SPANLANG 102,102B, SPANLIT 120,
Symbolic Systems	66-81	4	70-85	-	PHIL 80
Urban Studies	36	37	73	25 units in concentration; capstone courses	URBANST 203

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 Office of the University Registrar. To be awarded a bachelor's degree with multiple majors, the student must fulfill the following requirements:

1. Formally declare all majors 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 http://registrar. stanford.edu.

When students cannot meet the requirements of multiple majors without overlaps, the secondary major, outlined below, 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.

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.

DEGREES, HONORS, AND MINORS

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 awarded in Spring Quarter. Stanford University awards no honorary degrees.

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 *Time Schedule of Classes*. 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 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.

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 Office of the University Registrar in writing. Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate in a subsequent term.

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 students' transcripts 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.

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 Office of the University Registrar.

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.

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:

- Education
- Environmental Science, Technology, and Policy
- Ethics in Society
- Feminist Studies
- International Security Studies
- Humanities
- 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.

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)—PSO can be granted for up to two quarters to those undergraduates for whom it is academically appropriate. Undergraduates in the terminal quarter who are completing honors theses or clearing incomplete grades may petition for PSO. Undergraduates requiring registered student status can also petition for PSO. PSO does not permit any course enrollment or auditing.

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.

Graduation Quarter—Undergraduates may petition to register for Graduation Quarter registration status in the quarter in which they are receiving a degree if all course work and University requirements have been completed, and the student has formally applied to graduate. Undergraduates approved for completing up to 15 final units out of residence, or Last Units Out of Residence status, may also petition for Graduation Quarter. Students on Graduation Quarter are registered at Stanford and, therefore, have the rights and privileges of registered students. Only one Graduation Quarter may be requested.

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 or, for Law students, Autumn and Winter semesters) 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 F1 or J1 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.
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 non-immigrant 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.

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. 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, 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.

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 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' (withdrew).

Students who fail to be either enrolled by the 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 reenrollment 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://www.stanford.edu/dept/DoR/GSH/childbirth.html.

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 the Veterans Educational Benefits section of "Admissions and Financial Aid" above.

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]
Engineer2	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.	86 semester (129 quarter)	30
M.L.S.	30 semester (45 quarter)	0[4]
L.L.M., J.S.M., J.S.D.	26 semester (39 quarter)	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 master'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 master'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.

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 program, see Coterminal Bachelor's and Master's Degrees in the "Undergraduate Degrees" 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. (One semester unit or hour equals 1.5 quarter units.)

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 one quarter. No transfer credit is given for 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.

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 the 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.)
- *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 within the established time limits. 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 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 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 Procedures. (These are included in the *Stanford 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.

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.

The TGR Final Registration status may also be granted for one quarter only to a graduate student who is returning after reinstatement, or to graduate students who register 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: $2,760 per quarter in 2008-09. 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 a few 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.
2. A graduate or professional student must have enrolled or have been on an approved leave of absence in the term immediately preceding the term chosen as the graduation quarter.
3. The student has formally applied to graduate.
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. Only one graduation quarter may be requested. 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 by the deadline for each term. The deadlines are published in the *Time Schedule of Classes*. 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. 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.

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 Office of the University Registrar in writing. 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 or on an approved leave of absence 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 or on an approved leave of absence. Otherwise, a new Application for Graduate Admission must be submitted and an application fee paid. The Graduate Program Authorization Petition is submitted directly 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 programs 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 Office of the University Registrar. 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.

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 the Stanford 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 in the *Graduate School of Business M.B.A. Handbook*. 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 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. Standards for professional presentation of the thesis have been established by the Committee on Graduate Studies and are detailed in *Directions for Preparing Theses for Engineer Degrees*, available from the Office of the University Registrar, 630 Serra Street, Suite 120.

The deadline for submission of theses for degree conferral in each term is specified by the University academic calendar. Three copies of the thesis, bearing the approval of the adviser under whose supervision it was prepared, 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 thesis.

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. The period between the last day of final exams of one term and the first day of the subsequent term is considered an extension of the earlier term. Students submitting a thesis during this period would meet the registration requirement but would be eligible for degree conferral only in the subsequent term.

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 or 30 term units of work 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 30 term units of work in the School of Law, including three first-year courses in the first Autumn term and at least one course or seminar requiring a research paper. All work shall conform to the rules and regulations of the University and the School of Law.

MASTER OF LAWS

The degree of Master of Laws (L.L.M.) is conferred upon candidates who have completed one academic year (26 semester units) in residence in accordance with the rules of the University and the School of Law. 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 (26 term units) with distinction in accordance with the rules of the University and the School of Law.

The degree is primarily designed for those qualified students who hold a J.D. or its equivalent and who are at the Stanford School of Law 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). Full particulars 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 School of Law over not less than three academic years and who otherwise have satisfied the requirements of the University and the School of Law.

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 School of Law, a contribution to knowledge. Such work and dissertation must conform to the rules of the School of Law and the University for the dissertation and the University Oral Examination, as described in the "Doctor of Philosophy" section.

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 below 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 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.

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.

Directions for preparation of the dissertation are available from the Office of the University Registrar or at http://registrar.stanford.edu/shared/publications.htm#GradStud. 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 dissertation copies.

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 an 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 as a student constitutes a commitment by the student to abide by University policies, rules, and regulations, including those concerning registration, academic performance, student conduct, health and safety, 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, and regulations. A collection is available on the Stanford University policy web site at http://www.stanford.edu/home/administration/policy.html. Many are also set forth in the *Research Policy Handbook* and the *Graduate Student 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, or regulations.

NOTIFICATION

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 RECORDS

REGISTRATION AND STUDY LISTS

As early as possible, but no later than the second Sunday of the quarter, 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 may not enroll in more units than their tuition charge covers, nor 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 below.

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.

For full registration procedures, see the quarterly *Time Schedule*.

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 fourth 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 drop 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 sixth 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 *Time Schedule* or 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). The maximum may be exceeded by seniors only once for compelling reasons. A past superior academic performance is not considered to be sufficient justification for exceeding the maximum. Petitions for programs 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, fieldwork, 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.

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. 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.

When a student is granted 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' (withdrew).

Students who have exceeded their eight quarters of approved leave 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 University Registrar or the Committee.

Applications for reinstatement must be submitted to the Office of the Vice Provost for Undergraduate Education no later than four 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 and grades given in one quarter do not appear on any student's transcript until all grades received by the grade deadline have been recorded; generally, this is two weeks after final exams. 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://registrar.stanford.edu/students/records/diplomas.htm. 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	10 or more	9 or more
Half time:	6 or 7	6-10	6-9	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 next heading).
   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 serving on an official committee, 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 professional responsibility.
   c. The University may disclose 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. 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.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA) AND TAX DEPENDENT STATUS

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 University course and student residence use

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

Students may prohibit the release of any of the items listed above (except name and SUNet ID) by designating which items should not be released on the Privacy function of Axess. Students may prohibit the release of their SUNet ID and/or name (and consequently all other information) after an appointment with the Office of the University Registrar to discuss the ramifications of this action.

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

ID cards are available to registered students, faculty, and regular staff through the Stanford ID Card Office, 632 Serra Street. 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.

Married students or students with a domestic partner (same or opposite sex) may obtain a courtesy identification card for their spouse/ partner through the Stanford Card ID Office. The spouse/partner card enables use of some campus services during terms for which the student is registered.

Similar courtesy cards are also available to the spouses and same-sex partners of faculty and regular staff.

ID cards bear a photograph of the cardholder. This photograph is maintained in an online database and, as stated above in Directory Information, is available for classroom 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/.

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 shall be made known not later that 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 selecting courses, students should take cognizance of the official schedule of final examinations announced in the quarterly *Time Schedule*. Students anticipating conflicts in final examination schedules should seek to resolve these with the instructors involved before submitting Study Lists at the end of the second week of the quarter. If accommodation cannot be made at that time, the student should revise his or her Study List 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).

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 is published quarterly in the *Time Schedule* 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 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

The following reflects changes adopted by the Faculty Senate on June 2, 1994 and effective Autumn Quarter 1995-96. All grades/notations for courses taken in 1995-96 or later are to be visible on student transcripts.

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

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. For those students admitted as freshmen for Autumn Quarter 1996-97 or later, 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. Students who enter Stanford as transfer students in 1996-97 or later 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 students 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.

In courses taken before 1994-95, satisfactory completion of the course work when an 'I' has been given is expected within a year from the date of the course's final examination, but an alternate time limit may be set by the instructor. Students may petition that these courses with an 'I' grade be removed from their records.

In a course taken in 1994-95 or later, '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, above.)

W The notation 'W' (meaning Withdrew) 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.

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 "Statement on Student Academic Grievance Procedures" section of this bulletin).

GRADUATE SCHOOL OF BUSINESS GRADES

Effective September 2000, all courses offered by the Graduate School of Business are graded according to the following 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.

Students in some GSB courses may elect to take the course on a pass/fail basis, where any passing grade (H, HP, P, or LP) is converted to Pass, and U is converted to Fail. Students wishing to take a GSB course on a pass/fail basis should consult the GSB Registrar for rules and procedures.

SCHOOL OF LAW GRADES

The Law School is transitioning to a new grading system effective Autumn 2008-09. Third-year J.D. students remain on the prior grading system but all other students are on the new grading system. For more information, see http://www.law.stanford.edu/experience/studentlife/SLS_Student_Handbook.pdf. The grades in the new system are:

H Honors
P Pass
R Restricted Credit
F Fail

The old system number grades with letter equivalents are:

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-		

In the old system, students may take a limited number of courses on a credit/restricted credit/no credit system (K/RK/NK). 'K' is awarded for work that is 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). Some courses are offered on a mandatory credit (KM)/no credit (NK) basis. 'N' is a temporary notation in a continuing course, replaced with a final grade upon completion of the 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.

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 information, see http://med.stanford.edu/md/curriculum/assessment-grading.html.

ACADEMIC STANDING

Undergraduates matriculating in Autumn 1999 and thereafter are required to adhere to the academic standards described below. The standards include maintaining 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 matriculating *prior to* Autumn 1999 are required to adhere to the academic standards described below 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.

Undergraduate students 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 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. Students on probation or provisional registration status (see definitions below) are required to complete a minimum of 12 units per quarter (by the end of the final quarter examination period for each quarter) for each quarter for three consecutive quarters, 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, deferments 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 '*' until the course is completed satisfactorily and the final grade reported. (See the "Grading Systems" section of this bulletin.)

Students on probation or provisional registration require approval in advance from Undergraduate Advising and Research (UAR) in order to participate in Stanford's Overseas Studies Program or Stanford in Washington.

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 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 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 a cumulative grade point average of at least 2.0, shall be placed on provisional registration 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 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 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 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.

While students suspended for the first time are suspended for one year, students suspended a subsequent time are generally suspended for 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 three years are not eligible to enroll for twelve quarters (including Summer Quarter) following the quarter in which the suspension was issued. Students are required to submit a properly endorsed petition for provisional registration to request reenrollment after the suspension period has been completed.

Return from Suspension—Students who have been suspended are required to petition for provisional registration to return after their suspension has been completed.

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 for provisional registration.

RETURNING FROM SUSPENSION

Instructions including deadlines for requesting provisional registration should be obtained from the Office of the Vice Provost for Undergraduate Education, Sweet Hall, first floor. The C-USP Subcommittee on Academic Standing, or those designated by the subcommittee, acts upon all requests concerning academic standing, including requests for provisional registration. Questions concerning academic standing or the petitioning process should be directed to the Office of the Vice Provost for Undergraduate Education.

Students returning from suspension should also contact appropriate campus offices, e.g. 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 provisional registration petition. 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.

STATEMENT ON STUDENT ACADEMIC GRIEVANCE PROCEDURES

The following policy was effective beginning in the 1999-2000 academic year and is subject to periodic review.

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. Grievance procedures apply 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; (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. They do not pertain to complaints expressing dissatisfaction with a University policy of general application challenged on the grounds that the policy is unfair or inadvisable, nor do they pertain to individual school, department, or program academic policies, as long as those policies are not inconsistent with general University policy.
   c. Individuals should be aware that the University Ombudsperson's 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 Ombudsperson's 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. A delay in filing a grievance may, taking all circumstances into account, constitute grounds for rejection of the grievance.
   c. *The Response to the Grievance:*
      1. The relevant dean shall consider 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 shall consider the matter and report to the dean as the latter directs. The dean shall inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and shall 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 shall decide the grievance, and shall 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.
   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 shall 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 shall 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. A delay in filing an appeal may, taking all circumstances into account, 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 shall inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and shall 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 shall decide the appeal, and shall 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 Section 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 shall 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.

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 Section 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 shall be final. If the President decides to entertain the further appeal, he or she shall follow the general procedures set forth in Section 2e above, and the decision of the President shall 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 shall file his or her grievance with the Provost, rather than with the dean, and the Provost shall handle that grievance in accordance with the procedures set forth in Section 2c above.
   b. There shall be 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 shall 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: John Bravman
Web Site: http://undergrad.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. The VPUE supports faculty and departments by providing resources for fostering excellence in teaching, advising and mentoring, and undergraduate research. The Bing Overseas Studies Program, Center for Teaching and Learning, Diversity Outreach, Freshman and Sophomore Programs, Freshman Dean's Office, Introduction to Humanities, New Student Orientation/Approaching Stanford, Program in Writing and Rhetoric, Hume Writing Center, Undergraduate Advising and Research, and Writing in the Major report to the VPUE. 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.

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 (Technology and Teaching): to be announced
Associate Director for Academic Support: Adina Glickman
Tutoring and Academic Skills Specialist: Amy Chambers
Administrators: David Leech, Cristen Osborne, Linda Salser
Oral Communication Program Director and Senior Lecturer: Doree Allen
Oral Communication Specialists and Tutor Managers: Jennifer Hennings, Lindsey Paul
Lecturers: Thomas Freeland, Joyce Moser, Marianne Neuwirth, Leslie Townsend, James Wagstaffe, Randall A. Williams

Department Offices: September-December 2008: Terman Building.
Starting January 2009: 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 have the subject code CTL.

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.

Free tutoring is available to undergraduates in several subjects; see http://tutoring.stanford.edu for details on where and when tutors can be found. Students qualified for tutoring may apply to be tutors and, if accepted, are expected to take CTL's course on tutoring; the application process takes place in 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 teachers 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 teachers 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 also has responsibility for helping teaching assistants (TAs) with their preparation for and effectiveness in teaching and for helping departments with designing effective TA training programs. Programs include: videotaping, microteaching, 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; an informative quarterly newsletter; 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. To schedule an appointment, see http://speakinghelp.stanford.edu. For further details, call (650) 725-4149 or 723-1326 or see http://ctl.stanford.edu/Oralcomm.

FRESHMAN AND SOPHOMORE PROGRAMS

Assistant Vice Provost and Program Director: Sharon Palmer
Associate Director: Lee West
Academic Technology Specialist: Edward O'Neill
Oral Communication Lecturer: Joyce Moser
College Programs Associate: LaCona Woltmon
Administrators: Gari Gene, Mona Kitasoe, Marie Ochi-Jacobs, Teresa Nguyen

Department Offices: Sweet Hall, 1st floor
Phone: (650) 723-4338
Fax: (650) 736-2797
Email: froshsophprograms@stanford.edu
Web Sites: http://introsems.stanford.edu; http://soco.stanford.edu

Freshman and Sophomore Programs (FSP), a division of the office of the Vice Provost for Undergraduate Education, sponsors and supports Freshman-Sophomore College, as well as Stanford Introductory Seminars, including Freshman Seminars, Sophomore Seminars and Dialogues, and Sophomore College. FSP also coordinates initiatives that encourage faculty and students to build on relationships formed in introductory seminars by forming ongoing mentoring and research partnerships based on their shared intellectual interests. FSP is located on the first floor of Sweet Hall. For detailed information, see the web site or contact the office.

FRESHMAN-SOPHOMORE COLLEGE

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. For more information, see http://frosoco.stanford.edu.

STANFORD INTRODUCTORY SEMINARS

Participating Faculty: Over 200 faculty from more than 60 departments take part in Introductory Seminars programs. See faculty listings in each department's section of this bulletin for pertinent information.
SIS Offices: Sweet Hall, 1st floor, 590 Escondido Mall
Mail Code: 94305-3091
Phone: (650) 723-4338
Email: froshsophprograms@stanford.edu
Web Sites: http://introsems.stanford.edu; http://soco.stanford.edu

Stanford Introductory Seminars (SIS) 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 introductory seminars programs. The courses are given department credit and most count towards an eventual major in the field. Most also fulfill General Education Requirements (GERs).

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

FRESHMAN SEMINARS AND SOPHOMORE SEMINARS AND DIALOGUES

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 2008-09, see the "Stanford Introductory Seminar Courses" section of this bulletin. For an application or more information, see the SIS annual course catalogue, published each September, or http://introsems.stanford.edu.

All seminars require a brief application. See the *Time Schedule*, the *Stanford Introductory Seminars Course Catalogue* published each September, or http://introsems.stanford.edu. Due dates for 2008-09 applications for both freshman and sophomore preference courses are: Autumn Quarter, 5 p.m., September 19; Winter Quarter, noon, December 5; Spring Quarter, noon, March 13.

SOPHOMORE COLLEGE

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 sophomore assistants, and faculty in constructing a community of scholars. They are also encouraged to explore the full range of Stanford's academic resources 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. Eligible students will have been enrolled for no more than three academic quarters; be sophomores in the Autumn Quarter during which the college is offered; be in good academic standing; and have completed at least 36 units of academic work by the end of the Spring Quarter preceding the college. Students must also have an on-campus housing assignment for the ensuing academic year and intend to enroll in the Autumn Quarter. Admitted students who are found to have academic standing problems after the completion of Spring Quarter may have their admission revoked. The Sophomore College program fee covers tuition, room, board, books, and class-required travel arranged by the program. The total fee is $1300, but all students automatically receive an $800 scholarship. Each student pays the remaining $500, which is included in the University Bill. Financial aid is available. Students are also responsible for travel to campus (or to another site for some off-campus seminars), phone, network activation fees, and other personal expenses. Courses are announced in March, and applications are due in April. For a list of Sophomore College Seminars offered in 2008-09, see the "Sophomore College Courses" section of this bulletin. For more information or to apply, see http://soco.stanford.edu.

FRESHMAN DEAN'S OFFICE

Associate Vice Provost and Dean of Freshmen: Julie Lythcott-Haims
Assistant Dean of Freshmen: Koren Bakkegard
Offices: Sweet Hall, 1st floor
Mail Code: 94305-3094
Phone for freshmen and transfer students: (650) 723-7674
Phone for parents: (650) 725-0649
Email: frosh@stanford.edu
Web Site: http://undergrad.stanford.edu

The Freshman Dean's Office welcomes and integrates freshmen into Stanford from acceptance of admission through the end of the first undergraduate year. It addresses students' individual transitional needs, connects students to resources and opportunities, and cultivates an understanding of Stanford's history and traditions. The office is also a resource for transfer students and parents.

INTRODUCTION TO THE HUMANITIES PROGRAM

Director: Russell A. Berman
Associate Director: Ellen Woods
*Affiliated Faculty:*Jean-Marie Apostolidès (French and Italian), Shahzad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), Chris Bobonich (Philosophy), Philippe Buc (History), Scott Bukatman (Art and Art History), David Como (History), Charitini Douvaldzi (German Studies), Dan Edelstein (French and Italian), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Zephyr Frank (History), Michael Friedman (Philosophy), Marisa Galvez (French and Italian), Robert Harrison (French and Italian), Linda Hess (Religious Studies), Ian Hodder (Archaeology and Anthropology), Nadeem Hussain (Philosophy), Christian Kaesser (Classics), William Koski (Law), Helen Longino (Philosophy), Henry Lowood (University Libraries, German Studies), Marsh H. McCall, Jr. (Classics), Ian Morris (Classics), David Palumbo-Liu (Comparative Literature), Robert Proctor (History), Alice Rayner (Drama), Rob Reich (Political Science), Eric Roberts (Computer Science), Rob Robinson (German Studies), Janice Ross (Drama), Walter Scheidel (Classics), Helen Stacy (Law), Jennifer Summit (English), Blakey Vermeule (English), Barbara Voss (Archaeology and Anthropology), Ban Wang (Asian Languages), Amir Weiner (History), Bryan Wolf (Art and Art History), Tobias Wolff (English), Lee Yearley (Religious Studies), Yiqun Zhou (Asian Languages)
Lecturers: Lalaie Ameeriar, Ahmed Alwishah, Rashida Braggs, Renu Cappelli, Bill Carter, Sarah Cervenak, Anita Chan, Kathleen Coll, Jon Daehnke, Xinyu Dong, Michael Feola, Sabrina Ferri, Melissa Ganz, James Genone, Gillian Goslinga, Abby Heald, Phillip Horky, Michael Hunter, Jesse Kauffman, Joann Kleinneiur, Laura Maguire, Michael McFall, Zena Meadowsong, Martina Meyer, Alice Petty, Christy Pichichero, Jennifer Rapp, Uzma Rizvi, Laurel Scotland-Stewart, Dana Sherry, Maya Soifer, Melissa Stevenson, Anise Strong, Nicolas Tackett, David Walter, Candace West, Gabriel Wolfenstein, Joshua Wright

Department Offices: Sweet Hall, Second Floor
Mail Code: 94305-3068
Department 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 the Humanities. For information on the program, see the "Structured Liberal Education" section of this bulletin.

OVERSEAS STUDIES PROGRAM

Program Director: Norman Naimark
Stanford Program in Australia
Director, Centre for Marine Studies, University of Queensland: Ove Hoegh-Guldberg
Faculty: Kevin Arrigo, Bill Casey, Sophie Dove, Norm Duke, John Hall, Ron Johnstone, Davey Kline, Ian Lilly, Selina Ward
Stanford Program in Beijing
Director: Xiaohong Shen
Faculty: Dong Chen, Bobai Li, Kun Li, Jean Oi, Scott Rozelle, Andrew Walder, Xixin Wang, Shizhou Wang, Yun Zhou
Stanford Program in Berlin
Director: Karen Kramer
Faculty: Brigid Barton, Maria Biege, Camilla Bork, Ulrich Brückner, Regina Casper, Knut Ebeling, Charlotte Fonrobert, Dubravka Friesel-Kopecki, Martin Jander, Wolf-D. Junghanns, Ingo Klein, Christa Maerker, Matthias Pabsch, Orrin Robinson, Jari Splettstoesser, Sylke Tempel, Jochen Wohlfeil
Stanford Program in Florence
Director: Ermelinda Campani
Faculty: Khaled Fouad Allam, Guilio Cifarelli, Paolo Galluzzi, Charles Loverme, Giuseppe Mammarella, Leonardo Morlino, Fiorenza Quercioli, Joan Ramon Resina, Filippo Rossi, Emanuela Scarpellini, Kenneth Schultz, Carolyn Springer, Timothy Verdon, Luisa Vierucci
Stanford Center for Technology and Innovation (SCTI)—Kyoto
Director: Andrew Horvat
Faculty: Toshihiko Hayashi, Ursula Heise, Catherine Ludvik
Stanford Program in Madrid
Director: Santiago Tejerina-Canal
Faculty: Francisco Javier Bobillo de la Pena, Eva Botella Ordinas, María Teresa Camblor Portilla, Julia Doménech Lopez, Tamar Herzog, Sheila Klaiber, Miguel Larrañaga Zuleuta, Pablo de Lora del Toro, Laura Murcia, Susan Sartarelli, Francisco Seujo Maceiras, Lisa Surwillo, Juan Andres Walliser
Stanford Program in Moscow
Program Director: Alexander Abashkin
Faculty: Tatyana Boldyreva, Maxim Bratersky, Galina Filatova, Sergey Kortunov, Liza Kurganova, Vladimir Mau, Dmitri Trenin, Olga Zinovieva
Stanford Program in Oxford
Director: Geoffrey Tyack
Faculty: Paddy Bullard, Giovanni Cappocia, Helena Chance, Helen Kidd, Robert McMahon, Emma Plaskitt, Jack Rakove, Richard Rowley, Robert Siegel, Bart van Es
Stanford Program in Paris
Director: Estelle Halevi
Faculty: Mark Applebaum, Keith Baker, Laurie Boussaguet, Colette Deremble, Jean Paul Deremble, Jean-Marie Fessler, Sonia Gourevitch, Patrick Guedon, Sylvain Guyot, Laurent Habert, Jan Keppler, Eloi Laurent, Jacques Le Cacheux, Benoit Leguet, Richard Martin, Florence Mercier, Elizabeth Molkou, Anne Muxel, Anastasia-Erasmia Peponi, Christian de Perthuis, Martial Poirson, Pauline Reychman, Sylvie Strudel, Fabrice Virgili
Stanford Program in Santiago
Director: Iván Jaksic
Faculty: Mabel Abad, César Albornoz, Andrés Bobbert, Ignacio Briones, Germán Correa, Uta Francke, Claudio Fuentes, Sergio Micco, Sergio Missana, Oscar Muñoz, Alvaro Palma, Hernan Pons, Jorge Ruffinelli, Bernardo Subercaseaux, Sharon Reid

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

Courses given in the Overseas Studies Program have subject codes beginning with OSP and are listed in the "Overseas Studies Courses" sections of this bulletin..

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, Florence, Kyoto, Madrid, Moscow, Oxford, Paris, and Santiago offer courses in engineering, humanities, sciences, and social sciences 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 Berlin, Florence, Kyoto-SCTI, Madrid, Moscow, and Paris programs. Research opportunities are available in various formats at different centers. 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.

Overseas Studies also offers a limited number of special programs including, in 2008-09, ten three-week faculty-led seminars at overseas locations.

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.

STRUCTURED LIBERAL EDUCATION

Director: Roland Greene (Comparative Literature)
Coordinators: Suzanne Greenberg and Greg Watkins
Lecturers: Suzanne Greenberg, Rashi Jackman, Nicole Lopez, Jeremy Sabol, Greg Watkins

Department Offices: Sweet Hall, Second Floor, and Florence Moore Hall
Mail Code: 94305-8581
Department Phone: (650) 725-0102
Email: sle-program@stanford.edu
Web Site: http://sle.stanford.edu

The Program in Structured Liberal Education (SLE) offers freshmen an interdisciplinary approach to the liberal arts. The program emphasizes intellectual rigor and individualized contact between faculty and students. SLE has three basic purposes: to present a coherent program of instruction; to develop a student's ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in logical reasoning, critical reading, expository writing, and group discussions. 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-to-serve answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

The residence hall is the informal setting for lectures and small group discussions. SLE instructors work closely with students and participate in dorm life. SLE enhances the classroom experience with other residence-based educational activities, including a weekly film series 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 should be willing to make a commitment for the entire year.

PROGRAM IN WRITING AND RHETORIC

Faculty Director: Andrea A. Lunsford
Associate Director: Marvin Diogenes
Assistant Directors: Christine Alfano, Nancy Buffington
Acting Writing in the Major Director: Marvin Diogenes
Hume Writing Center Director: Clyde Moneyhun
Hume Writing Center Associate Director for Honors Writing: Hilton Obenzinger
Hume Writing Center Assistant Directors: Patti Hanlon-Baker, Sohui Lee
Lecturers: Christine Alfano, Paul Bator, Julia Bleakney, Shaleen Brawn, Nancy Buffington, Joel Burges, Dana Carluccio, Subho Chakravarty, Kevin DiPirro, Mark Feldman, Marjorie Ford, Wendy Goldberg, Patti Hanlon-Baker, Arturo Heredia, Scott Herndon, Jonathan Hunt, Donna Hunter, Melissa Leavitt, John Lee, Sohui Lee, Sangeeta Mediratta, Kimberly Moekle, Kelly Myers, Alyssa O'Brien, John Peterson, Gabrielle Ribera-Moyer, Carolyn Ross, Helle Rytkonen, Kim Savelson, Susan Schuyler, Rod Taylor, John Tinker, Jonah Willihnganz, Susan Wyle
Teaching Affiliates: Regina Arnold (Autumn), Lee Konstantinou (Autumn), Jenna Lay (Autumn), Michael Reid (Autumn)

Department Offices: Building 460, Room 223, Margaret Jacks Hall
Mail Code: 2085
Department Phone: (650) 723-2631
Email: pwrcourses@stanford.edu
Web Site: http://ual.stanford.edu/AP/univ_req/PWR/Req.html

Courses given in the Program in Writing and Rhetoric have the subject code PWR.

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 "Courses" section below and 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.html. 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.html. In addition to PWR 2, designated Center for the Teaching of Learning (CTL) courses and Stanford Introductory Seminars (SIS) satisfy the second-level Writing and Rhetoric requirement (Write-2). SIS courses require an additional application form; see http://ual.stanford.edu/OO/intro_seminars/IntroSemsCurrent.html and the SIS Winter and Spring supplements 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 regular Writers' Nights featuring fiction and poetry readings, the "How I Write" series of dialogues with Stanford faculty, and spoken word performances. For further details on the center, see http://ual.stanford.edu/ARS/help_writing/WritingProject.html.

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.

UNDERGRADUATE ADVISING AND RESEARCH

Director (Acting): Carol Porter
Program Office: Sweet Hall, first floor
Phone: (650) 723-2426
Fax: (650) 725-1436
Web Site: http://undergrad.stanford.edu
Email: vpue-advising@stanford.edu, vpue-research@stanford.edu
Appointments: http://undergrad.stanford.edu

The Office of Undergraduate Advising and Research (UAR) helps students realize the full intellectual richness of undergraduate life at Stanford. UAR advisers work directly with students in one-on-one interactions to help them develop their scholarly interests before and after they declare a major, overcome obstacles to their academic success, immerse themselves in their chosen fields, engage with faculty, take advantage of academic opportunities and resources outside their major departments, and, for some students, to prepare for post-baccalaureate study.

The UAR staff includes professional advisers in Sweet Hall, academic directors (ADs) in Branner, Florence Moore, Freshman-Sophomore College, Lagunita, Roble, Stern, Toyon, and Wilbur residence halls, the South Row, and the Athletic Academic Resource Center. Freshmen are assigned to academic advisers (faculty and academic staff) according to their preliminary academic interest and residence. The academic directors associated with the residences and UAR advisers 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 services include:

- assistance with curriculum planning, including overseas studies
- 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
- use of the resource library and membership on email lists
- referrals to campus tutoring resources and counseling offices

SCHOLARSHIPS AND FELLOWSHIPS, AND POST-BACCALAUREATE STUDIES

Along with the Overseas Resource Center (http://icenter.stanford.edu/orc), UAR staff help students to compete for merit scholarships and post-baccalaureate fellowships. UAR also administers campus nomination competitions for the Goldwater, Udall, Beinecke, Center for the Study of the Presidency, Jack Kent Cooke, Carnegie, Liebmann, and Truman scholarships, as well as the Goldman Sachs Global Leaders Program. Binders containing applications of previous winners are available in the offices of academic directors and on the first floor of Sweet Hall.

UAR offers workshops and individual consultations on choosing a graduate or professional school, such as in law or the health professions, writing personal statements, soliciting letters of recommendation, and preparing 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.

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 2008-09 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 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.

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, and (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.

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 may apply through the UAR office for 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 an official request for proposal form, see http://vpuedepartmentalgrants.stanford.edu. Students should check with UAR staff to determine which departments and centers currently sponsor research programs.

Individual faculty members may also apply through the UAR office for VPUE Faculty Grants for Undergraduate Research. Faculty Grants provide funding for undergraduates to work closely with faculty on a directed research project. Typical student research activities include conducting literature reviews, developing and conducting research surveys, collecting and analyzing data, aiding in the development of course materials, and conducting laboratory experiments. Faculty determine student participation in this program, so students should contact departments and faculty for more information. For an official request for proposal form, see http://vpuefacultygrants.stanford.edu.

SUMMER RESEARCH COLLEGE

Summer Research College (SRC) is a residential program directed by UAR for students engaged in faculty-mentored research endeavors on campus over the summer.

SRC aims to foster close intellectual and social contact among students and faculty in an interdisciplinary residential community. During the day, students work with their faculty advisers or research groups campus-wide. In the evenings and on weekends, they have opportunities to share in research discussions, dinners with faculty guests, social and cultural activities, and other informal gatherings with fellow researchers.

SRC is not a source of funding for student research; it is a residential program intended to enrich undergraduates' summer research experience. Residents of SRC obtain funding through UAR and non-UAR funding programs. For more information about SRC, including registration procedures and college policies, see http://src.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 crossdisciplinary 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.

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) chooses 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.

HONOR CODE AND FUNDAMENTAL STANDARD

The Honor Code and Fundamental Standard establish the conditions for academic work at Stanford and represent an agreement between students and faculty about their responsibilities for learning and teaching. The Interpretations and applications of the Honor Code, the Student Judicial Charter of 1997, the Student Conduct Penalty Code, statistics, and other documents related to Judicial Affairs are available at the Judicial Affairs web site at http://judicialaffairs.stanford.edu.

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://www.stanford.edu/dept/DoR/rph/2-8.html.

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://www.stanford.edu/dept/DoR/rph/Chpt5.html.

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://www.stanford.edu/dept/DoR/rph/2-6.html.

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://www.stanford.edu/dept/DoR/rph/2-11.html.

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://www.stanford.edu/dept/DoR/rph/2-5.html.

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 presence 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, to create networks and foster cross-disciplinary 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,* Gayton E. Germane, Charles A. Holloway,* Charles T. Horngren, James E. Howell, Robert K. Jaedicke, Harold J. Leavitt, 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, James T. S. Porterfield, Michael L. Ray, Henry S. Rowen, Myron S. Scholes, William F. Sharpe, George P. Shultz, A. Michael Spence, 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: Robert L. Joss

Senior Associate Deans: Mary E. Barth, Glenn R. Carroll, David M. Kreps, Daniel N. Rudolph

Associate Deans: Gale H. Bitter, Christina Einstein, Sharon J. Hoffman, David Kennedy, Claudia J. Morgan, Karen A. Wilson

Assistant Deans: Derrick Bolton, Andrew Chan, Robert Urstein, Randy Yee

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, George Foster, Steven R. Grenadier, Deborah H. Gruenfeld, Michael T. Hannan, J. Michael Harrison, Chip Heath, Peter B. Henry, Robert L. Joss, Daniel P. Kessler, Roderick M. Kramer, Keith Krehbiel, David M. Kreps, Sunil Kumar, David F. Larcker, James M. Lattin, Edward P. Lazear, Hau L. Lee, John G. McDonald, Maureen F. McNichols, Haim Mendelson, Dale T. Miller, Margaret A. Neale, Charles A. O'Reilly, James M. Patell, Jeffrey Pfeffer, Paul C. Pfleiderer, Evan L. Porteus, Madhav Rajan, Hayagreeva Rao, Stefan J. Reichelstein, Peter C. Reiss, D. John Roberts, Garth Saloner, Kathryn L. Shaw, Baba Shiv, Itamar Simonson, Kenneth J. Singleton, Jesper Sørensen, Venkataraman Srinivasan, Larissa Z. Tiedens, Lawrence W. Wein, Seungjin Whang, Stefanos Zenios, Jeffrey H. Zwiebel

Associate Professors: C. Lanier Benkard, Jerker Denrell, Michaela M. Draganska, Yossi Feinberg, Francis J. Flynn, Wesley Hartmann, Ron Kasznik, Ilan Kremer, Phillip Leslie, Brian S. Lowery, Benoit Monin, Stefan Nagel, Paul Oyer, III, Joseph D. Piotroski, Erica L. Plambeck, Kenneth W. Shotts, Andrzej Skrzypacz, Alan T. Sorensen, Ilya A. Strebulaev, Zakary L. Tormala, Tunay I. Tunca, S. Christian Wheeler, Bilge Yilmaz

Assistant Professors: Anne Beyer, Jules H. van Binsbergen, T. Renee Bowen, Ilan Guttman, John W. Hatfield, Joy Ishii, Alan D. Jagolinzer, Dirk Jenter, Saumitra Jha, Uzma Khan, Arthur G. Korteweg, Claire Lim, Neil Malhotra, Ian W. R. Martin, Elizabeth Mullen, Harikesh S. Nair, Sridhar Narayanan, Maria Ogneva, Michael Ostrovsky, Francisco Pérez-González, Monic J. Sun, Robert P. Swinney

Professor (Teaching): James A. Phills, Jr.

Acting Assistant Professors: Margrét V. Bjarnadóttir, Anamaria Pieschacon

Courtesy Professors: Timothy F. Bresnahan, M. Kate Bundorf, Robert M. Daines, Alan M. Garber, Warren H. Hausman, Ronald A. Howard, Mark G. Kelman, Larry Kramer, Daniel A. McFarland, Debra E. Meyerson, Paul R. Milgrom, Walter W. Powell, Ilya Segal, Myra H. Strober, Robert I. Sutton, Paul Yock

Senior Lecturers: Jeffrey H. Moore, John D. Schramm

Lecturers: Douglas Abbey, Dick Allen, Laura K. Arrillaga, Rick Aubry, Wasim Azhar, Leslie Berlin, Eric Bettinger, Scott Bristol, Anne Casscells, Robert B. Chess, R. James Ellis, Richard P. Francisco, John W. Glynn Jr., Andrew S. Grove, William Guttentag, Brad Handler, David Hornik, Florence M. Hoylman, John Hurley, Franklin P. Johnson Jr., Robert L. Jones, Kathryn K. Kostopoulos, Mark Leslie, Leo E. Linbeck III, Michael E. Marks, R. Bruce McKern, William L. McLennan, William F. Meehan III, Robert Miller, Marie Mookini, John P. Morgridge, Robert Pearl, Joel C. Peterson, Andrew Rachleff, Carole Robin, Dennis M. Rohan, Diane W. Savage, Eric E. Schmidt, Russell Siegelman, Carl S. Spetzler, F. Victor Stanton, Jane Wei-Skillern, Peter C. Wendell, Evelyn Willliams, John C. Williams

Consulting Professors: Anthony S. Bryk, H. Irving Grousbeck, Mark A. Wolfson

Visiting Professors: Charles I. Jones, Charles Lee, Stephen M. Schaefer, Carol Scott, John Van Reenen

* 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://www.gsb.stanford.edu.

SCHOOL OF EARTH SCIENCES

Dean: Pamela A. Matson
Associate Dean for Academic Affairs and Diversity: Jerry M. Harris

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 Interdisciplinary Graduate Program in Environment and Resources (IPER), and the graduate-level Earth, Energy, and Environmental Sciences Graduate Program (EEES). The Earth Systems Program and 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; and (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.); and graduate programs offering the degrees of Master of Science, Engineer, and Doctor of Philosophy as described below. Details of individual degree programs are found in the section for each department or program.

DEGREE PROGRAMS IN EARTH SCIENCES

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.

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
Associate Director: Deana Fabbro-Johnston
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: Mitchell Building, Room 365
Mail Code: 2215
Web Site: http://earthsci.stanford.edu/EEES

Courses offered by the Earth, Energy, and Environmental Sciences Program have the subject code EEES, and are listed in the "Earth, Energy, and Environmental Sciences (EEES) Courses" section of this bulletin.

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

To ensure that students are appropriately placed in this program, a statement of purpose submitted with the application for admission must reflect the student's reasoning for pursuit of a crossdisciplinary program of study in contrast to a more traditional disciplinary one readily provided by a department in the School of Earth 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 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.
2. 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.
3. The program of study must be approved by the research adviser and the academic oversight committee.
4. All students are required to complete a M.S. thesis, approved by the student's thesis committee.

DOCTOR OF PHILOSOPHY IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

In addition to the University's basic requirements for the doctorate, the Interdepartmental Program in Earth, Energy, and Environmental Sciences has the following requirements:

1. 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. Ph.D. students must take the three core courses: EEES 300, Earth Sciences Seminar; EEES 301, Earth Dynamics; and EEES 302, Challenges and Best Practices in Crossdisciplinary Research and Teaching. The research advisers and academic oversight committee have primary responsibility for the adequacy of the course of study.
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. 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.
4. Prior to taking the oral qualifying examination at or before the end of the 6th 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.
5. 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.
6. 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.

In addition to the three core courses, 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.

Additional information may be found in the *Graduate Student Handbook* at http://www.stanford.edu/dept/DoR/GSH.

EARTH SYSTEMS

Director: Robert B. Dunbar
Associate Director, Academics: Julie Kennedy, Senior Lecturer
Associate Director, Administration: Deana Fabbro-Johnston
Committee of the Whole: Kevin Arrigo (Environmental Earth System Science, Earth, Energy and Environmental Sciences), Gregory Asner (Department of Global Ecology, Carnegie Institution), Carol Boggs (Biology), Margaret Caldwell (Law), Page Chamberlain (Environmental Earth System Science), Gretchen Daily (Biology, Interdisciplinary Program in Environment and Resources), Mark Denny (Biology, Hopkins Marine Station), Rodolfo Dirzo (Biology), Robert B. Dunbar (Environmental Earth System Science), William Durham (Anthropology), 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 (Geological and Environmental Sciences), David Freyberg (Civil and Environmental Engineering), Margot Gerritsen (Energy Resources Engineering), Deborah Gordon (Biology), Lawrence Goulder (Economics), Elizabeth Hadly (Biology), George Hilley (Geological and Environmental Sciences), David Howell (Earth Systems), David Kennedy (History), Donald Kennedy (Biology, Freeman Spogli Institute for International Studies, emeritus), Julie Kennedy (Earth Systems), Rosemary Knight (Geophysics), Jeffrey Koseff (Civil and Environmental Engineering), Anthony Kovscek (Energy Resources Engineering), 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 (Freeman Spogli Institute for International Studies), Franklin M. Orr, Jr. (Global Climate and Energy Project, Energy Resources Engineering), Jonathan Payne (Geological and Environmental Sciences), Stephen H. Schneider (Biology, Freeman Spogli Institute for International Studies), Gary Schoolnik (Medicine), James Sweeney (Management Science and Engineering), Barton Thompson (Law), David Victor (Freeman Spogli Institute for International Studies), Peter Vitousek (Biology), Virginia Walbot (Biology), Mark Zoback (Geophysics)

Program Offices: Yang and Yamazaki (Y2E2), Room 131
Mail Code: 94305-4215
Phone: (650) 725-7427
Email: deana@stanford.edu
Web Site: http://pangea.stanford.edu/ESYS

Courses offered by the Earth Systems Program have the subject code EARTHSYS, and are listed in the "Earth Systems (EARTHSYS) Courses" section of this bulletin.

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 in computer science, economics and 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. 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 of their choice.

The following is an outline of the sequential topics covered and skills developed in this major.

1. The fundamental components of the Earth Systems Program help students understand current environmental problems against the backdrop of natural change through introductory course work in geology, biology, and economics. Depending on the Earth Systems track chosen, training may also include introductions to the study of energy systems, microbiology, oceans, or soils. Students find that many programs and departments at Stanford offer courses that approach the role that humans play in affecting these systems. Students are encouraged to come to the Earth Systems office for course selection advice and to pick up a current list of environmental courses at Stanford.
2. Focus 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 is 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, and two core courses concerning, respectively, the biogeosphere and the anthrosphere: EARTHSYS 111, Biology and Global Change, and EARTHSYS 112, Environmental Economics and Policy.
   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. Development of skills to recognize, quantify, and report change in the environment: key analytical and computational tools and measurement systems are used for insight into global and regional environmental change, and in the development of solutions.
   Required foundation and breadth classes and track classes: students build skills in the student's ability to recognize, describe, quantify, and help solve complex problems that face society. For example, training in satellite remote sensing and geographic information systems is either required or recommended for all tracks. Quantification of environmental problems requiring training in calculus, linear algebra, chemistry, physics, programming, and statistics are required of majors. Specialized training, such as in laboratory or field methods, is recommended.
   Workable solutions to environmental problems require the ability to effectively communicate ideas and results. Writing intensive courses (WIM) help students to communicate complex concepts to expert and non-expert audiences. Stanford requires that each student complete one WIM course in the major. The WIM requirement is met through completion of EARTHSYS 195, Effectively Communicating Environmental Concepts. Other Earth Systems courses also focus on effective written and oral communication.
4. Work to design solutions to environmental problems that take into consideration natural processes as well as human needs: human needs must be met in sustainable ways that focus on ecosystem health, human prosperity, and long-term effectiveness.

A comprehensive list of environmental courses, and advice on those that focus on problem solving, is available in the program office. Students can also review the quarterly *Time Schedule* for solution-based courses. Among others, the following departments and programs may provide subject areas that are a useful guide: Anthropology, Biology, Civil and Environmental Engineering, Economics, Environmental Earth System Science, Geological and Environmental Sciences, Geophysics, Human Biology, International Policy Studies, International Relations, Law, Energy Resources Engineering, Political Science, Public Policy, and Urban Studies. Earth Systems emphasizes the importance of workable solutions through a required 9-unit internship, knowledge synthesis in the senior seminar, an optional upper division course on environmental problem solving, or an honors project. The Earth Systems Program provides an advising network that includes faculty, staff, and student peer advisers.

UNDERGRADUATE PROGRAMS IN EARTH SYSTEMS

BACHELOR OF SCIENCE IN EARTH SYSTEMS

The B.S. in Earth Systems (EARTHSYS) requires the completion of at least 110 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 and must complete five required and three elective courses in that track. 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 course. *Note:* students interested in earning a California Teaching Credential for general high school science through the STEP program should contact the program office for guidelines.

REQUIRED CORE

Subject and Catalog Number	*Units*
EARTHSYS 10. Introduction to Earth Systems	4
EARTHSYS 111. Biogeosphere	4
EARTHSYS 112. Environmental Economics and Policy	5
EARTHSYS 195. Effectively Communicating Environmental Concepts (WIM)	4
EARTHSYS 210. Senior Seminar	3
EARTHSYS 260. Internship *or* EARTHSYS 250. Directed Research	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

Computer Programming:

CS 106A. Programming Methodology	5

Economics:

ECON 1A. Elementary Microeconomics	5
ECON 50. Economic Analysis I	5

Geological and Environmental Sciences:

GES 1. Fundamentals of Geology	4

Mathematics:

MATH 19. Calculus	3
MATH 20. Calculus	3
MATH 21. Calculus	4
or MATH 41. Calculus	5
MATH 42. Calculus	5
and 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 110. Statistical Methods in Engineering and Physical Sciences	4
STATS 116. Theory of Probability	3-5
STATS 160. Introduction to Statistical Methods	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

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	4
EARTHSYS 189. Field Studies in Earth Systems	5
EESS 143. Marine Biogeochemistry	3-4
EESS 155. Science of Soils	3

Conservation Biology (choose one):

HUMBIO 112. Conservation Biology	4
BIOHOPK 173H. Marine Conservation Biology	1-3

Ecology (choose two):

BIO 101. Ecology	3
BIO 125. Ecosystems of California	3
BIO 136. Evolutionary Paleobiology	4
BIO 145. Behavioral Ecology	4

Ecosystems and Society (choose one):

ANTHRO 160B. Conservation Anthropology	5
ANTHRO 162. Indigenous Peoples and Environmental Problems	3-5
ANTHRO 164A. Ethnoecology	3-5
ANTHRO 170A. Issues in Water, Health and Development	5
ANTHRO 179A. Ethical Debates in Environment and Health Policy	5

ANTHROSPHERE

ADDITIONAL FOUNDATION AND BREADTH COURSES:

CHEM 33. Structure and Reactivity	4
PHYSICS 45. Light and Heat	4

Choose one course in each of the three sub-categories, 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
ECON 243. Economics of the Environment	2-5
EARTHSYS 147. Controlling Climate Change in the 21st Century	3
EARTHSYS 175. The California Coast: Science, Policy, and Law	3-4
MSE 243. Energy and Environmental Policy Analysis	3
MSE 248. Economics of Natural Resources	3-4

Social Entrepreneurship and the Environment:

MSE 245G. Finance 1 for Non-MBAs	4
MSE 280. Organizational Behavior: Evidence in Action	3-4
MSE 285. Negotiation	3
URBANST 132. Concepts and Analytical Skills for the Social Sector*	4
URBANST 133. Social Entrepreneurship Collaboratory	4

Sustainable Development:

ANTHRO 160B. Conservation Anthropology	5
ANTHRO 162. Indigenous Peoples and Environmental Problems	3-5
ANTHRO 164A. Ethnoecology	3-5
ANTHRO 361. Human Behavioral Ecology	3-5
BIO 102. Demography: Health, Development, Environment	3
CASA 185. Environmental Ethics	3-5
CASA 343. Culture as Commodity	5
CASA 349. Anthropology of Capitalism	4-5
CASA 364. The Anthropology of Development	5
CEE 124. Sustainable Development Studio	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
POLISCI 140. Political Economy of Development	5
POLISCI 143. Nongovernmental Organizations and Development in Poor Countries	5
URBANST 163. Land Use Control	4

LAND SYSTEMS
ADDITIONAL FOUNDATION AND BREADTH COURSES:

EARTHSYS 144. Fundamentals of GIS 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:

ANTHRO 170A. Issues in Water, Health and Development 5
CEE 101B. Mechanics of Fluids 4
CEE 166A. Watersheds and Wetlands 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 176A. Energy Efficient Buildings 3
HISTORY 252G. Environmental History of Urban America 5
HISTORY 267E. The Suburban West 5
HISTORY 267F. Cities in the North American West, 1840-1940 4-5
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

ENERGY SCIENCE AND TECHNOLOGY
ADDITIONAL FOUNDATION AND BREADTH COURSES:

PHYSICS 43. Electricity and Magnetism 3

Energy Resources and Technology: (Choose one of the below combinations):

CEE 176A. Energy Efficient Buildings 3-4
CEE 176B. Electric Power: Renewables and Efficiency 3-4
and
EARTHSYS 101. Energy and the Environment 3
EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes 3
or EARTHSYS 103. Energy Resources 4-5

Energy Fundamentals:

ENGR 30. Engineering Thermodynamics 3

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 at Sea (EARTHSYS 323)
One quarter abroad at the Stanford in Australia Program
One quarter at the Hopkins Marine Station

UPPER-DIVISION ELECTIVES

Three intermediate to advanced courses, 100 level or above, minimum of 3 units, consistent with the primary track are required of majors and must be approved. Eligible upper-division electives are listed below. Additional courses may be chosen; see the program office for the most current list.

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
EARTHSYS 180. Fundamentals of Sustainable Agriculture 3

ANTHROSPHERE TRACK

ANTHRO 160B. Conservation Anthropology 5
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

LAND SYSTEMS TRACK

Only two electives are required for the Land Systems track.

CEE 166B. Floods and Droughts, Dams and Aqueducts 3
CEE 173A. Energy Resources 4-5
CEE 175A. California Coast: Science, Policy, and Law 3-4
GES 112. Mapping the Geological Environment 3
GES 131. Environmental Earth Sciences II: Fluvial Systems and Landscape Evolution 3
HISTORY 268S. American Wests: Studies in Culture and the Environment 4-5
INTNLREL 161A. Global Human Geography: Asia and Africa 5
INTNLREL 161B. Global Human Geography: Europe and Americas 5
URBANST 132. Concepts and Analytic Skills for the Social Sector 4

ENERGY SCIENCE AND TECHNOLOGY TRACK

CEE 156. Building Systems 4
EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes 3
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
ENERGY 260. Groundwater Pollution and Oil Slicks: Environmental Problems in Petroleum Engineering 3
ENERGY269. Geothermal Reservoir Engineering 3
GEOPHYS 200A. Oil and Water: Oil Peaks and Oil Panics 2-3
ME 131A. Heat Transfer 3

OCEANS TRACK

BIOHOPK 161H. Invertebrate Zoology 5
BIOHOPK 163H. Principles of Oceanic Biology 4
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	26
Required allied courses	49-62

TRACKS

Anthrosphere	24-30
Biosphere	23
Energy Science and Technology	24
Land Systems	23
Oceans	28
Upper-division electives	9-15
Effectively Communicating Environmental Concepts	4
Senior research or internship	9
Senior seminar	3
Total units (depending on track, electives)	105-136

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 3.3 in Earth Systems course work. Potential honors students should complete the Biogeosphere and Anthrosphere

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 Woods Institute for the Environment. More information on Goldman may be obtained by phoning (650) 723-5697.

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. An undergraduate majoring in Earth Systems 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 the master's seminar.

To apply, complete and return to the Earth Systems office an application that includes: a statement of purpose; a Stanford transcript; two letters of recommendation, one of which must be from the master's adviser; and 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. A $50 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, or (2) 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.

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.

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 Winter Quarter master's seminar (EARTHSYS 290) and have additional responsibilities appropriate to the master's level (thesis presentation, modeling problems, and so on), 2 units.

A more detailed description of the coterminal master's degree program may be obtained from the program office. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

ENERGY RESOURCES ENGINEERING

Emeriti: (Professors) John W. Harbaugh, Sullivan S. Marsden, Jr.
Chair: Louis J. Durlofsky
Professors: Khalid Aziz, Sally M. Benson, Louis J. Durlofsky, Roland N. Horne, André Journel,* Franklin M. Orr, Jr.
Associate Professors: Jef Caers, Anthony R. Kovscek, Tapan Mukerji, Hamdi Tchelepi
Assistant Professors: Margot Gerritsen, Jennifer Wilcox
Courtesy Professors: Stephan A. Graham, Mark Jacobson
Lecturer: Louis M. Castanier
Consulting Professors: Ruben Juanes, Warren K. Kourt, Robert G. Lindblom, Kiran Pande, Marco R. Thiele
Acting Assistant Professor: James Lambers

* Joint appointment with Geological and Environmental Sciences

Department Office: GESB 065
Mail Code: 94305-2220
Phone: (650) 723-4744
Email: peteng@sesmail.stanford.edu
Web Site: http://pangea.stanford.edu/ERE

Courses offered by the Department of Energy Resources Engineering have the subject code ENERGY, and are listed in the "Energy Resources Engineering (ERE) Courses" section of this bulletin.

Effective September 1, 2007, the Department of Energy Resources Engineering (ERE) now awards the following degrees: the Bachelor of Science, Master of Science, Engineer, and Doctor of Philosophy in Energy Resources Engineering. The department continues to award the Master of Science, Engineer, and Doctor of Philosophy in Petroleum Engineering. The department no longer awards undergraduate degrees in Petroleum Engineering except in cases where students declared Petroleum Engineering as their major prior to academic year 2007-08. 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 reservoir properties, drilling wells, designing and operating production facilities, selecting and implementing methods for enhancing fluid recovery, examining the environmental aspects of petroleum 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 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 and it operates laboratories for research in enhanced oil recovery processes 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. Each graduate student office has one 3 GHz dual-Pentium 4 computer per student.

UNDERGRADUATE PROGRAMS IN ENERGY RESOURCES ENGINEERING

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 industries.

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 a real energy-resource related problem of current interest.

PROGRAM

The requirements for the B.S. degree in Energy Resources Engineering are similar 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.

In brief, the unit and subject requirements are:

Subject	*Minimum Units*
Energy Resources Core	18
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	178-187

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 161. Statistical Methods for the Earth and Environmental Sciences	3-4
ENERGY 175. Well Test Analysis	3
ENERGY 199. Senior Project & Seminar in Energy Resources (WIM)	4
Total	19-20

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
MATH 52. Integral Calculus of Several Variables
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
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 182. 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 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

HONORS PROGRAM

A limited number of majors may be admitted to the honors program at the beginning of their senior year.

To be admitted, the student must have a grade point average (GPA) of at least 3.0 in all course work in the University. In addition to the minimum requirements for the B.S. degree, the student must complete 6 units of advanced energy resources engineering courses and at least 3 units of research (ENERGY 193).

Students who wish to be admitted to the honors program should consult with their adviser before the start of their senior year. Those who do not meet all of the formal requirements may petition the department for admission. Those completing the program receive the B.S. degree in Energy Resources Engineering with honors. An overall 3.5 GPA is required in all energy resources engineering courses for graduation with honors.

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 161. Statistics for Earth, Energy, and Environmental Sciences 3-4

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. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 Petroleum 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 energy resources engineering background. Competence in computer programming in a high-level language (CS 106X or the equivalent) and knowledge of energy resources 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 at least a grade point average (GPA) of 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
EE 293A. Fundamentals of Energy Processes	3-4
EE 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
EE 293A. Fundamentals of Energy Processes	3-4
EE 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. The program of study must be approved by the academic adviser and the department graduate program committee.
4. 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
EE 293A. Fundamentals of Energy Processes	3-4
EE 293B. Fundamentals of Energy Processes	3-4
MS&E 248. Economics of Natural Resources	3-4
Total	24-27

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

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	3
ENERGY 251. Thermodynamics of Equilibria	3
Total	15

Natural Resource Characterization

ENERGY 240. Geostatistics	3
ENERGY 241. Practice of Geostatistics	3
ENERGY 244. Modeling of 3D Geological Objects	3
GEOPHYS 262. Rock Physics	3
GES 144. Geographic Information Systems	3
Total	15

TECHNICAL ELECTIVES

ENERGY 23. Reservoir Simulation
ENERGY 102. Renewable Energy Sources and Greener Energy Processes
ENERGY 104. Technology in the Greenhouse
ENERGY 120. Fundamentals of Petroleum Engineering
ENERGY 260. Groundwater Pollution and Oil Spills
ENERGY 284. Optimization
ENERGY 301. The Energy Seminar
CEE 176A. Energy Efficient Buildings
CEE 176B. Electric Power: Renewables and Efficiency
EARTHSYS 145/245. Energy Flow and Policy: The Pacific Rim
EARTHSYS 147/247. Controlling Climate Change in the 21st Century
ECON 250A. Natural Resource and Energy Economics
ECON 250B. Environmental Economics
GES 138. Urbanization, Global Change, and Sustainability
GES 230. Physical Hydrogeology
GES 231. Contaminant Hydrogeology
MATSCI 316. Nanoscale Science, Engineering, and Technology
ME 131A. Heat Transfer
ME 150. Internal Combustion Engines
ME 260. Fuel Cell Science Technology
ME 370B. Energy Systems II: Modeling and Advanced Concepts

MASTER OF SCIENCE IN INTEGRATED RESERVOIR MODELING

This M.S. degree requires a minimum of 45 units of which 39 should be course units. The following courses are suggested for this program.

MATH SEQUENCE

Subject and Catalog Number	*Units*
CME 200. Linear Algebra with Application to Engineering Computations	3
CME 204. Partial Differential Equations in Engineering	3

ENERGY RESOURCES ENGINEERING SEQUENCE

ENERGY 246. Reservoir Characterization and Flow Modeling	3
ENERGY 130. Well Logging	3
or ENERGY 175. Well Test Analysis	3
ENERGY 221. Fundamentals of Multiphase Flow	3
or ENERGY 222. Advanced Reservoir Engineering	3
ENERGY 223. Reservoir Simulation	3-4

GEOSTATISTICS SEQUENCE

ENERGY 240. Geostatistics for Spatial Phenomena	3-4
ENERGY 241. Practice of Geostatistics and Seismic Data Integration	3-4

GEOLOGY SEQUENCE

GES 151. Sedimentary Geology	4
GES 253. Petroleum Geology	3

GEOPHYSICS SEQUENCE

GEOPHYS 182 Reflection Seismology	3
or GEOPHYS 183. Reflection Seismology Interpretation	1-4
GEOPHYS 262. Rock Physics	3

ENGINEER IN PETROLEUM ENGINEERING OR ENERGY RESOURCES ENGINEERING

The objective 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. The student must complete 24 units of letter-graded course work, develop a written Ph.D. research proposal, and choose a dissertation 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—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 present 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 petition for an extra quarter before presenting the Ph.D.

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.

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 ENERGY RESOURCES ENGINEERING

To be recommended for a Ph.D. degree with Petroleum Engineering as a minor subject, a student must take 20 units of selected 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: C. Page Chamberlain, Robert B. Dunbar, Scott E. Fendorf, Chris Field,* Steven M. Gorelick, Pamela A. Matson†, Paul Switzer**
Assistant Professors: Christopher Francis, Leif Thomas
Acting Assistant Professor: Alexandre Boucher
Courtesy Professors: Stephen Monismith, Peter M. Vitousek
Courtesy Associate Professor: Ken Caldeira
Courtesy Assistant Professor: Gregory P. Asner
Visiting Professors: Carlota Escutia, Ruth Blake, Ruben Kretzschmar, Wolfgang Kinzelbach, Brian McAdoo, Roy Wogelius

* Joint appointment with Biology
† Joint appointment with the Freeman Spogli Institute for International Studies
** Joint appointment with Statistics

Department Offices: Yang & Yamazaki (Y2E2), Room 135
Mail Code: 94305-4215
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Web Site: http://pangea.stanford.edu/eess

Courses offered by the Department of Environmental Earth System Science have the subject code EESS, and are listed in the "Environmental Earth System Science (EESS) Courses" section of this bulletin.

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. EESS 300, Earth Sciences Seminar.
2. A minimum of 45 units of course work at the 100 level or above.
3. 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.
4. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
5. Some students may be required to make up background deficiencies in addition to these basic requirements.
6. 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.

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 obtain 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. 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.
2. 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.
3. Students must complete EESS 300, Earth Sciences Seminar, in their first quarter at Stanford.
4. 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.
5. 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 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,* William R. Evitt, John W. Harbaugh, James C. Ingle, Jr.,* Juhn G. Liou,* Ronald J. P. Lyon, Michael McWilliams, George A. Parks, Irwin Remson, Tjeerd H. Van Andel
Chair: Stephan A. Graham
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, Jonathan Payne, Wendy Mao
Professors (Research): Atilla Aydin, Martin J. Grove, J. Michael Moldowan
Courtesy Professors: Ronaldo Borja, Simon L. Klemperer, James O. Leckie, Alfred M. Spormann
Courtesy Associate Professors: Elizabeth Hadly, Anders Nilsson
Lecturers: Anne E. Egger, Bob Jones
Consulting Professors: Alan Cooper, Brent Constantz, Francois Farges, Thomas L. Holzer, Jack J. Lissauer, Les Magoon, Mark S. Marley, Timothy R. McHargue, Kenneth Peters, Joseph Wooden
Consulting Associate Professor: Robyn Wright-Dunbar
Visiting Professors: Demir Altiner, Andrew Barth, Gary Byerly, Harry Green, Bas van de Schootbrugge, Diane Seward, Terry Seward

* Recalled to active duty

** Joint appointment with Energy Resources Engineering

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Web Site: http://pangea.stanford.edu/GES

Courses offered by the Department of Geological and Environmental Sciences have the subject code GES, and are listed in the "Geological and Environmental Sciences (GES) Courses" section of this bulletin.

The geological and environmental sciences are naturally interdisciplinary, and include: the study of earth materials, earth processes, and how they 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 Stanford Linear Accelerator Center (SLAC), Stanford Synchrotron Radiation Laboratory (SSRL), and the U.S. Geological Survey in Menlo Park are 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.

UNDERGRADUATE PROGRAMS IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

BACHELOR OF SCIENCE IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The undergraduate program leading to the Bachelor of Science (B.S.) degree in Geological and Environmental Sciences (GES) is designed to leverage the diversity of the field and provide background for a wide variety of careers. Students who complete the undergraduate GES major or minor have gone on to graduate school in the earth sciences and/or employment in geological and environmental consulting, land use planning, law, public service, teaching and other professions in which an understanding of the earth and a background in science are important.

The major consists of five interrelated components:

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.

Quantitative and Analytical Skills—Students must complete adequate course work in mathematics, chemistry, and physics or biology. They are introduced to the analytical techniques specific to the earth sciences through the laboratory component of courses.

Advanced Course Work and Research—Students gain breadth and depth by choosing upper-level electives and are encouraged to apply these skills and knowledge to problems in the earth sciences through research.

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 (GES 190, GES 112) 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.

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 81 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 (81-92 UNITS TOTAL)

CORE GEOLOGICAL AND ENVIRONMENTAL SCIENCES COURSES

Subject and Catalog Number	*Units*
GES 1. Dynamic Earth	4
or GES 49N. Field Trip to Death Valley and Owens Valley	3
EESS 2. Earth System History	3
GES 102. Earth Materials	5
GES 103. Rocks in Thin Section	3
GES 150. Senior Seminar: Issues in the Earth Sciences (WIM)	3
GES 190, other field course, or field research (6 weeks)	

Four of the following (others may count as electives):

GES 90. Introduction to Geochemistry	3-4
GES 110. Structural Geology and Tectonics	5
or GES 111A. Fundamentals of Structural Geology	3
GES 151. Sedimentary Geology and Petrography	4
EESS 155. Science of Soils	4
or GES 130. Environmental Earth Sciences I	3
or GES 170. Environmental Geochemistry	4
GES 180. Igneous Processes	3-5
or GES 181. Metamorphic Processes	3-5

REQUIRED SUPPORTING MATHEMATICS

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

Students must complete course sequences from two of the three fields of cognate sciences: chemistry, physics, and biological sciences. 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
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

ELECTIVES (19 UNITS)

Majors must complete at least 19 units of upper-division electives. A majority (at least 10) of these units must be from courses within GES, excluding GES 7, introductory seminars (GES 30-60), and GES 201. Many courses from departments other than GES are also approved electives; this list is available from the undergraduate program coordinator and at http://pangea.stanford.edu/GES/undergraduates. Additional courses may satisfy this requirement but require prior approval from the undergraduate program director. A maximum of 3 elective units may be fulfilled by GES 192, 198, or an upper-level seminar. Honors research (GES 199) may fulfill up to 6 elective units. Students should discuss their electives with an adviser.

COGNATE COURSES

Most 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 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:

BIOHOPK 182H. Stanford at Sea
BIO 121. Biogeography
BIO 136. Evolutionary Paleobiology
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

FIELD RESEARCH (6 WEEKS)

Majors must complete six weeks of field research, preferably through departmental offerings (GES 190). Approved field schools offered by another university or other faculty-directed field research projects that involve learning and application of field techniques and the preparation of a written report may be used to fulfill the field research requirement.

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 6 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 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 selected with the advice and consent of the adviser. Typically, electives are selected from the list below. Letter grades are required if available.

COURSE SEQUENCE (88-99 UNITS TOTAL)

REQUIRED GEOLOGICAL AND ENVIRONMENTAL SCIENCES (38-39 UNITS)

Subject and Catalog Number	*Units*
GES 1. Dynamic Earth	4
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	3-4

Environmental Sciences: Geostatistics	
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 (11-20 UNITS)

Choose four courses from the following list or, with faculty approval, four related courses:

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
ENGR 30. Engineering Thermodynamics	3
ENGR 50. Introductory Science of Materials	4
GEOPHYS 150. General Geophysics	4
GES 130. Soil Physics and Hydrology	3
GES 131. Hydrologically-Driven Landscape Evolution	3
GES 215A,B. Advanced Structural Geology and Rock Mechanics	3-5
GES 217. Characterization and Hydraulics of Rock Fracture	3
EESS 221. Contaminant Hydrogeology	4
GES 237. Surface and Near-Surface Hydrologic Response	3
MATH 103. Matrix Theory and its Applications	3
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 1. Dynamic Earth	4
or GES 49N. Field Trip to Death Valley and Owens Valley	3
EESS 2. Earth System History	3
GES 102. Earth Materials	5

ELECTIVES (12 UNITS)

Electives must include at least three courses from the list below:

GES 8. The Oceans	3
GES 90. Introduction to Geochemistry	3-4
GES 103. Rocks in Thin Section	3
GES 110. Structural Geology	5
GES 111A. Fundamentals of Structural Geology	3
GES 130. Soil Physics and Hydrology	3
GES 131. Hydrologically-Driven Landscape Evolution	3
EESS 164. Fundamentals of GIS	4
GES 151. Sedimentary Geology and Petrography	4
GES 170. Environmental Geochemistry	4
EESS 155. Science of Soils	4
GES 180. Igneous Processes	3-5
GES 181. Metamorphic Processes	3-5
GES 185. Volcanology	4

Students pursuing a minor in GES are encouraged to take one of the freshman or sophomore seminars (courses with numbers 38-59) and to participate in the senior seminar (GES 150) and in field research (GES 190). Up to 3 units of Stanford Introductory Seminars may be used in fulfilling the 12-unit requirement above.

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 to 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. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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, or (2) 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 student 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 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 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, Jerry M. Harris, Simon Klemperer, Rosemary J. Knight, Marcia McNutt,† Joan Roughgarden,** Paul Segall, Norman H. Sleep, Howard Zebker,* Mark D. Zoback
Associate Professor: Biondo Biondi
Assistant Professor: Jesse Lawrence
Professor (Research): Gerald M. Mavko
Courtesy Professors: Stephan A. Graham, David D. Pollard
Consulting Professors: James Berryman, Jonathan Glen, Antoine Guitton, Barry Kirkendall, Oskar Mencer
Consulting Associate Professors: Stewart Levin, Azadeh Tabazadeh
Visiting Professors: Sierd A.P.L. Cloetingh, Yo Fukushima, Jianguo Zhao
Senior Research Scientists: Robert Clapp, Jack Dvorkin
Research Associates: Nigel Crook, Paul Hagin, Youli Quan, Tiziana Vanorio

* Joint appointment with Electrical Engineering
† Joint appointment with Monterey Bay Aquarium Research Institute
** Joint appointment with Biology

Department Offices: Mitchell Building, Room 365
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 have the subject code GEOPHYS, and are listed in the "Geophysics (GEOPHYS) Courses" section of this bulletin.

Geophysics is the branch of Earth science concerned with exploring and analyzing active processes of 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 biogeochemical cycling; 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.

UNDERGRADUATE PROGRAMS IN GEOPHYSICS

BACHELOR OF SCIENCE IN GEOPHYSICS

Objectives—To provide knowledge about the entire spectrum of geophysics from resource exploration to environmental geophysics to earthquake seismology and plate tectonics, built upon a solid background in the essentials of math, physics, and geology. Students are prepared for either an immediate professional career in the resources and environmental sciences industries or future graduate study.

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

FUNDAMENTAL GEOPHYSICS

GES 1. Fundamentals of Geology
GEOPHYS 150. General Geophysics
or GEOPHYS 190. Introduction to Geophysical Field Methods
GEOPHYS 201. Frontiers of Geophysical Research at Stanford

ADDITIONAL ELECTIVES

1. Three approved upper-level (100 or higher) Geophysics lecture courses, typically chosen from the following:
   GEOPHYS 107. Journey to the Center of the Earth
   GEOPHYS 140. The Earth from Space: Introduction to Remote Sensing
   GEOPHYS 150. General Geophysics and Physics of the Earth
   GEOPHYS 160. Waves
   GEOPHYS 170. Global Tectonics
   GEOPHYS 180. Geophysical Inverse Problems
   GEOPHYS 190. Introduction to Geophysical Field Methods
   GEOPHYS 222. Reflection Seismology
   GEOPHYS 262. Rock Physics
2. 6 units of GEOPHYS 185. Research Seminar Series (includes WIM requirement)
3. Three additional approved upper-level (100 or higher) Earth Sciences lecture courses, typically chosen from the above GEOPHYS electives or from the following:
   GES 102. Earth Materials
   GES 110. Structural Geology and Tectonics
   GES 111A. Fundamentals of Structural Geology
   GES 160. Statistical Methods for Earth and Environmental Sciences
   ENERGY 120. Fundamentals of Petroleum Engineering

PREREQUISITE COURSES

MATH 19,20,21. Calculus, or equivalent, or MATH 41,42. Calculus, a score of 4-5 on the Calculus BC AP exam, *and* MATH 53. Ordinary Differential Equations
PHYSICS 41 *and* 110. Mechanics and Intermediate Mechanics
EE 141. Engineering Electromagnetics
or PHYSICS 120. Intermediate Electricity and Magnetism
CHEM 31A,B. Chemical Principles 1 and 2, or CHEM 31X, Chemical Principles (accelerated), or a score of 4-5 on the Chemistry AP exam

RECOMMENDED ELECTIVE

CS 106A. Programming Methodology

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 shall be made jointly by the department and the student's adviser. This decision shall be 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 departmental program proposal form can be downloaded from http://geo.stanford.edu/GP/undergraduate/major.html.

CURRICULUM

GEOPHYS 102. Geosphere *or* GES 1. Fundamentals of Geology
GEOPHYS 150. General Geophysics
or GEOPHYS 190. Introduction to Geophysical Field Methods
GEOPHYS 201. Frontiers of Geophysical Research at Stanford
Two additional approved upper-level (100 or higher) Geophysics lectures courses, typically chosen from GEOPHYS 107, 140, 150, 160,170, 180, 190, 222, 262.
MATH 19,20,21 *or* 41. Calculus
PHYSICS 41. Mechanics

COTERMINAL B.S./M.S. PROGRAM IN GEOPHYSICS

The department offers a coterminal program. Interested individuals should check with a member of the department faculty for details. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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 letter grade.

Transfer credit—An incoming student with a relevant Master of Science degree may apply for a departmental waiver of up to 18 units of the 45 units required for the Ph.D. degree (see the "Doctor of Philosophy in Geophysics" section of this bulletin). Students without an M.S. degree may apply for waivers for individual courses taken in post-baccalaureate study at other institutions. Credit for courses generally requires that students identify an equivalent Stanford

course and obtain the signature of the Stanford faculty responsible for such a course stating its equivalence.

Waiving of any course requirements or substitution of electives other than those listed below requires the written consent of the student's faculty adviser and the Geophysics graduate coordinator.

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.
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. An acceptable program normally consists of at least 45 lecture units in the areas listed following. Up to 18 lecture units in categories 2, 4, and 6 may be satisfied by courses taken elsewhere if the previous course duplicates an existing Stanford course and the Stanford faculty member responsible for the course concurs. Required courses must be taken for a letter grade, if offered. Students are required to attend the department seminars.

1. ENGR 202W
2. GEOPHYS 201
3. 12 units of Geophysics lecture courses numbered 100 or higher.
4. 12 units of Geophysics lecture courses numbered 200 or higher, taken from at least four faculty members with different research specializations.
5. One 3-unit lecture course numbered 100 or higher in mathematics, science, or engineering covering mathematical methods, continuum or fluid mechanics, or Fourier/spectral analysis.
6. 9 units of 200-level or higher courses in math, science, engineering, or other quantitative science.
7. 6 units of non-Geophysics lecture courses numbered 100 or higher in Earth or planetary sciences, ecology, hydrology, chemistry, or relevant biology.
8. One 3-unit non-Geophysics lecture course numbered 200 or higher in Earth or planetary science, ecology, hydrology, chemistry, or relevant biology.
9. 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.
10. Two quarters of quarter-time teaching assistant experience. For more information, see the *Geophysics Administrative Guide*, section 1.4.1.

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. The student must pass the departmental oral examination by presenting and defending a written research paper or proposal 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.

INTERDISCIPLINARY GRADUATE PROGRAM IN ENVIRONMENT AND RESOURCES (IPER)

Director: Gretchen C. Daily (through December 2008); Peter Vitousek (effective January 2009)
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), Sally M. Benson (Energy Resources Engineering, Global Climate and Energy Program), Barbara Block (Biology), Alexandria Boehm (Civil and Environmental Engineering), Carol Boggs (Biology), Jef Caers (Energy Resources Engineering), Margaret Caldwell (Law), Page Chamberlain (Environmental Earth System Science), Joshua Cohen (Political Science), Gretchen C. Daily (Biology), Jennifer Davis (Civil and Environmental Engineering, Woods Institute for the Environment), 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), Christopher B. Field (Global Ecology, Carnegie Institution), Zephyr Frank (History), David Freyberg (Civil and Environmental Engineering), Oliver Fringer (Civil and Environmental Engineering), Margot Gerritsen (Energy Resources Engineering), Steven Gorelick (Environmental Earth System Science), Lawrence Goulder (Economics), 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), Raymond Levitt (Civil and Environmental Engineering), Richard Luthy (Civil and Environmental

Engineering), Pamela Matson (Dean, School of Earth Sciences), Douglas McAdam (Sociology), Monica McDermott (Sociology), Lynn Meskell (Anthropology), Fiorenza Micheli (Biology), Grant Miller (Medicine), Stephen Monismith (Civil and Environmental Engineering), Harold Mooney (Biology), Rosamond Naylor (Freeman Spogli Institute for International Studies), Franklin M. Orr, Jr. (Energy Resources Engineering), Leonard Ortolano (Civil and Environmental Engineering), Stephen Palumbi (Biology), Erica Plambeck (Business), Walter W. Powell (Education), Terry L. Root (Woods Institute for the Environment), Debra Satz (Philosophy), Stephen H. Schneider (Biology), Gary Schoolnik (Medicine), Richard Scott (Sociology), James Sweeney (Management Science and Engineering), Barton Thompson (Law, Woods Institute for the Environment), Shripad Tuljapurkar (Biology), David Victor (Law), Peter Vitousek (Biology), Jeremy Weinstein (Political Science), John Weyant (Management Science and Engineering), Richard White (History), Mark Zoback (Geophysics)

Senior Lecturer: Julie Kennedy
Lecturers: Michael Mastrandrea, Kirsten Oleson

Program Offices: Yang and Yamazaki (Y2E2), Suite 226
Mail Code: 4210
Phone: (650) 723-6117
Email: nelsondn@stanford.edu
Web Site: http://iper.stanford.edu

Courses offered by the Interdisciplinary Graduate Program in Environment and Resources have the subject code IPER, and are listed in the "Interdisciplinary Graduate Program in Environment and Resources (IPER) Courses" section of this bulletin.

The Interdisciplinary Graduate Program in Environment and Resources (IPER) is designed to create interdisciplinary scholars and leaders to address the world's most challenging environmental and sustainability challenges. 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.

IPER offers a Ph.D. 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 degrees are interdisciplinary, giving students exposure to environmental and sustainability issues and insight into new knowledge, technologies, and policies to help solve these problems. IPER students select classes offered in all seven schools of the University.

IPER faculty and student research and policy efforts address issues such as the science and policy of global climate change, regional security, the mapping and valuation of ecosystem services, energy development, agricultural intensification and variability, characterization and effects of land use change, and conservation finance. Research examples include: an analysis of the economics and eco-hydrological dynamics of water supplies in rapidly growing cities; an investigation of the impact of marine protected areas on the health of fisheries and on the economics of the fishing industry; and a study of the potential role of local transportation policies and incentives in reducing global greenhouse gas emissions. For additional information about IPER student research and other academic and professional activities, see http://iper.stanford.edu/research.

IPER's affiliated faculty members come from all seven Stanford schools and represent a diversity of environment and sustainability interests and research and policy approaches. More information about individual faculty can be found on the IPER web site (http://iper.stanford.edu/faculty); more details on 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 IPER Ph.D. and M.S. degrees are guided by comprehensive requirements created with faculty and student input and approved by IPER's executive committee. For more detail about the current Ph.D. and M.S. degree requirements, see http://iper.stanford.edu.

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 IPER Ph.D. students who do not continue the Ph.D.

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 joint 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. & M.S. in Environment and Resources degrees or joint J.D. & 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 100 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 total of 87 semester or 130.5 quarter units (compared to 86 semester units for the J.D. and 45 quarter units for the M.S. if pursued separately) and may be completed in three years. For additional information, see http://iper.stanford.edu/study/requirements.html#ms.

Students in the JDP are required to take two core courses: IPER 310, Environmental Forum Seminar, and IPER 335, Environmental Science for Managers and Policy Makers (same as OIT 338 and LAW 608). Students also complete at least eight other graded courses at the 100 level or higher, of which at least two must be at the 200 level or higher, while maintaining a 'B' average. A maximum of 4 units of directed research and independent study may be counted toward the M.S. Joint J.D./M.S. students are also required to take LAW 604, Environmental Law Workshop, and, as part of this class or an alternate one, to write a 25-35 page paper on a topic of their choosing that integrates their J.D. and M.S. course work. It is recommended that joint M.B.A./M.S. students take GSBGEN 339, Environmental Entrepreneurship.

Additional M.S. courses may be chosen from approved course lists in IPER's four focal areas (culture and institutions; economics and policy analysis; engineering and technology; or natural sciences) or from other courses at the appropriate level approved by the student's advising team. These courses are listed in the "Doctor of Philosophy in Environment and Resources" section of this bulletin. A maximum of 12 units (8 semester units) from the student's professional school, including Environmental Law Workshop units for Joint J.D./M.S. students, may be applied toward the M.S. A list of approved GSB and School of Law courses can be found in the M.S. requirements: http://pangea.stanford.edu/IPER/internal. In the approved GSB classes, joint M.B.A./M.S. students must focus their final projects on an environmental or natural resource topic for that course to be counted toward the M.S. While a science or mathematics background is not required for acceptance, quantitative skills are necessary for many courses and students may be required to take additional course work in quantitative methods.

The student's program of study is subject to the approval of the student's advising team, consisting of at least one faculty member from the applicable professional school and one faculty member from the student's IPER focal area. The two degrees are conferred when the requirements for both the IPER M.S. and the professional degree programs have been met. For application information, see http://iper.stanford.edu/apply/app_processMS.html.

DUAL MASTER'S DEGREE

Only students in the School of Medicine may apply to pursue the M.S. in Environment and Resources degree by meeting 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.

Students in this dual degree program must take two core courses: IPER 310, Environmental Forum Seminar; and IPER 335, Environmental Science for Managers and Policy Makers. Students also complete at least eight other graded courses at the 100 level or higher, of which at least two must be at the 200 level or higher, while maintaining a 'B' average. A maximum of 8 units of directed research and independent study may be counted toward the dual M.S./M.D. degree program. Additional M.S. courses may be chosen from approved course lists in 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 advising team. While a science or mathematics background is not required for acceptance, quantitative skills are necessary for many courses and students may be required to take additional course work in quantitative methods.

The student's program of study is subject to the approval of the student's advising team, consisting of at least one faculty member from the applicable professional school and an IPER faculty member. The degrees are conferred when the respective requirements have been completed. For application information, see http://iper.stanford.edu/apply/app_processMS.html.

MASTER OF SCIENCE

In exceptional circumstances, IPER offers a Master of Science degree for students in 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. Admission directly to the M.S. program is not allowed.

M.S. course work totals at least 45 units at or above the 100-level, of which the majority of units should be at or above the 200-level. Masters students normally complete the IPER Ph.D. core curriculum, comprising: IPER 310, Environmental Forum Seminar; IPER 320, Designing Environmental Research; and IPER 330, Research Approaches for Environmental Problem Solving. Additional courses may be selected from approved course lists in 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. 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. 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

IPER's Ph.D. requirements, updated annually at http://iper.stanford.edu/study/requirements.html#phd, 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: IPER 310, Environmental Forum Seminar (two quarters); IPER 320, Designing Environmental Research; and IPER 330, Research Approaches for Environmental Problem Solving, each with a letter grade of 'B' or higher. IPER Ph.D. students are also required to take IPER 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 are listed below; updates can be found at http://iper/study/requirements.html. Fulfillment of the breadth requirement must be certified by the student's two lead faculty advisers and the 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 approval by 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. Successful 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" section 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, 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 IPER 320 or IPER 330. 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. Submit at least one grant proposal for external funding, defined as fellowship and/or research funds provided by a government agency, a private foundation, or a University entity other than IPER or the School of Earth Sciences.

Participate each year in a Spring Quarter annual review in which the student and lead advisers submit progress reports to the IPER executive committee.

The following courses may be taken to satisfy the breadth requirement in IPER's four focal areas. Students should consult the current year's bulletin and time schedule to determine which courses are available this year.

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 breadth 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
EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions
ECON 228. Institutions and Organizations in Historical Perspective
HISTORY 281A. Environmental History of the Americas
HISTORY 276. Modern Brazil
LAW 280. Toxic Harms
LAW 281. Natural Resources Law and Policy
LAW 437. Water Law and Policy
LAW 455. Energy Law and Policy
LAW 603. Environmental Law and Policy
LAW 604. Environmental Law Workshop
LAW 605. International Environmental Law and Policy
LAW 667. Marine Resources
MS&E 252. Decision Analysis I
POLISCI 351A. Foundations of Political Economy
POLISCI 362. New Economics of Organizations
POLISCI 364. Theories of Political Institutions
POLISCI 424. Introduction to Political Psychology
POLISCI 435. Topics in the Philosophy of Social Science
POLISCI 436. Rational Choice
POLISCI 440A. Theories in Comparative Politics
POLISCI 440B. Comparative Political Economy
POLISCI 440C. Methods in Comparative Politics
POLISCI 442. Qualitative and Field Methods
PSYCH 223. Social Norms
PUBLPOL 102. Organizations and Public Policy
PUBLPOL 166. Organizational Theory and Design
PUBLPOL 194. Technology Policy
SOC 116. Globalization and Organizations
SOC 260. Formal Organizations
SOC 264. Firms, Markets, and States
SOC 314. Economic Sociology
SOC 318. Social Movement and Collective Action
SOC 320. Foundations of Social Psychology
SOC 360. Foundations of Organizational Sociology
SOC 362. Organization and Environment
SOC 363. Social and Political Processes in Organizations
SOC 363A. Seminar on Organizational Theory
SOC 364. Organizations as Governance Structures
SOC 367. Institutional Analysis of Organizations
SOC 377. Comparing Institutional Forms: Public, Private, and Nonprofit

ECONOMICS AND POLICY ANALYSIS BREADTH COURSES

One of the alternative course sequences listed below, culminating in IPER 243 (same as MS&E 243), satisfies the minimum breadth requirement:

ECON 50 *and* 51. Economic Analysis I and II
ECON 50. Economic Analysis I *and* ECON 155. Environmental Economics and Policy
ECON 202 *or* ECON 202N *and* ECON 203 *or* ECON 203N. Core Economics
ECON 206. World Food Economy
MS&E 241. Economic Analysis
MS&E 248. Economics of Natural Resources
PUBLPOL 201A. Microeconomics

Possible substitutes for IPER 243:
ECON 250. Environmental Economics
ECON 251. Natural Resources and Energy
PUBLPOL 201B. Cost-Benefit Analysis and Evaluation

The same alternative prerequisites listed above apply to PUBLPOL 201B, ECON 250, and ECON 251. PUBLPOL 201B focuses less on environmental issues than IPER 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 IPER 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 breadth 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 215. Goals and Methods of Sustainable Building Projects
CEE 161A, Rivers, Streams, and Canals
CEE 166B. Floods and Droughts, Dams and Aqueducts
CEE 172. Air Quality Management
CEE 207A. Energy Resources
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 260A. Physical Hydrogeology
CEE 262B. Transport and Mixing in Surface Water Flows
CEE 263A. Air Pollution Modeling
CEE 270. Movement and Fate of Organic Contaminants in Surface Waters and Groundwater
CEE 274E. Pathogens in the Environment
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
MS&E 250A. Engineering Risk Analysis

NATURAL SCIENCES BREADTH COURSES

At least two courses are required; alternative courses may be proposed through IPER's exception process.

IPER 250. Ecological Principles for Environmental Problem Solving
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 143. Evolution
BIO 144. Conservation Biology
BIO 175. Tropical Ecology and Conservation
BIO 247. Controlling Climate Change in the 21st Century
BIO 264. Biosphere-Atmosphere Interactions
BIO 216. Terrestrial Biogeochemistry
BIOHOPK 263H. Oceanic Biology
BIOHOPK 265H. Air and Water
BIOHOPK 266H. Molecular Ecology
BIOHOPK 272H. Marine Ecology
CEE 164. Introduction to Physical Oceanography
CEE 274A,B. Environmental Microbiology I,II
EARTHSYS. 208. Coastal Wetlands
EESS 141. Remote Sensing of the Oceans
EESS 143/231. Marine Biogeochemistry
EESS 155. Science of Soils
EESS 266. Soil Chemistry
EESS 162. Remote Sensing of Land Use and Land Cover
EESS 164. Fundamentals of Geographic Information Science (GIS)
EESS 220. Physical Hydrogeology
EESS 240. Advanced Oceanography
EESS 258. Geomicrobiology
EESS 259. Environmental Microbial Genomics
ENERGY 260. Groundwater Pollution and Oil Slicks
GEOPHYS 104. The Water Course
GEOPHYS 130. Biological Oceanography
GES 170. Environmental Geochemistry
GES 259. Marine Chemistry

SCHOOL OF EDUCATION

Emeriti: (Professors) J. Myron Atkin, John Baugh, Edwin M. Bridges, Robert C. Calfee, Larry Cuban, Elliot W. Eisner, Nathaniel L. Gage, James Greeno, Michael W. Kirst, Henry M. Levin, Richard Lyman (President emeritus), James G. March, William F. Massy, Nel Noddings, Ingram Olkin, Denis C. Phillips, Thomas Rohlen, Lee S. Shulman, George D. Spindler, Carl E. Thoresen, David B. Tyack, Decker F. Walker, Hans Weiler
Dean: Deborah J. Stipek
Associate Dean for Faculty Affairs: Edward Haertel
Associate Dean for Student Affairs: Eamonn Callan
Senior Associate Dean for Administration: Victoria Oldberg
Associate Dean for External Relations: Rebecca T. Smith
Assistant Dean for Academic Services: Rania Sanford
Professors: Arnetha Ball, Hilda Borko, Eamonn Callan, Martin Carnoy, William Damon, Linda Darling-Hammond, Claude Goldenberg, Pamela Grossman, Patricia J. Gumport, Edward Haertel, Kenji Hakuta, Connie Juel, John D. Krumboltz, David F. Labaree, Raymond P. McDermott, Milbrey McLaughlin, Jonathan Osborne, Amado M. Padilla, Roy Pea, Walter Powell, Francisco O. Ramirez, Daniel Schwartz, Richard J. Shavelson, Deborah J. Stipek, Myra H. Strober, Guadalupe Valdés, John Willinsky, Sam Wineburg
Associate Professors: Anthony L. Antonio, Brigid J. Barron, Eric Bettinger, Prudence Carter, Teresa C. LaFromboise, Susanna Loeb, Daniel McFarland, Debra Meyerson, Sean Reardon, David Rogosa
Assistant Professors: Jennifer Adams, Nicole M. Ardoin, Maren Songmy Aukerman, Paulo Blikstein, Bryan Brown, Leah Gordon, Ira Lit, Aki Murata, Christine Min Wotipka
Professors (Teaching): Shelley Goldman, Rachel Lotan
Courtesy Professors: Stephen Barley, Albert Camarillo, Carol Dweck, Paula England, Eric Hanushek, John Kennedy, William Koski, Clifford Nass, John Rickford
Courtesy Associate Professor: Robert Reich, Caroline Winterer
Courtesy Assistant Professors: Shashank Joshi
Lecturers: Angela Booker, Denise Pope, Ann Porteus
Consulting Professor: Michael Kamil
Consulting Associate Professors: Suki Hoagland, Thomas Keating

School Offices: Cubberley 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 have the subject code EDUC, and are listed in the "Education (EDUC) Courses" section of this bulletin.

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 ground-breaking, cross-disciplinary inquiries that shapes educational practices, their conceptual underpinnings, and the professions that serve the enterprise. The School of Education prepares scholars, teachers, teacher educators, policy analysts, evaluators, researchers, 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 honors program, and a variety of tutoring programs.

The School of Education is organized into three program area committees: Curriculum Studies and Teacher Education (C&TE); Psychological Studies in Education (PSE); 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 program.

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 focuses on graduate education and research training and does not offer an undergraduate major. However, undergraduate education is of concern to the school, and courses and programs are available to those interested in the field of education. The following courses are appropriate for undergraduates:
102. Culture, Class and Educational Opportunity
103A. Tutoring: Seeing a Child Through Literacy
103B. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices
103C. Educational Policy, Diversity, and English Learners
110. Sociology of Education: The Social Organization of Schools
112X. Urban Education
113X. Gender and Sexuality in Schools
116X. Service Learning as an Approach to Teaching
117X. Research and Policy on Postsecondary Access
124. Collaborative Design and Research of Technology: Integrated Curriculum
130. Introduction to Counseling
131. Mediation for Dispute Resolution
134. Career and Personal Counseling
137. Social Justice in Education
146X. Perspectives on the Education of Linguistic Minorities
149. Theory and Issues in the Study of Bilingualism
165. History of Higher Education in the United States
170X. Preparation for Independent Public Service Projects
171X. Early Childhood Education Practicum
178X. Latino Families, Languages, and Schools
177. Education of Immigrant Students: Psychological Perspectives
179. Urban Youth and their Institutions: Research and Practice
181. Multicultural Issues in Higher Education
191X. Introduction to Survey Research
193A. Listen Up! Core Peer Counseling Skills
193B. Peer Counseling in the Chicano/Latino Community
193C. Peer Counseling in the African American Community
193F. Psychological Well-Being on Campus: Asian American Perspectives
193N. Peer Counseling in the Native American Community
193P. Peer Counseling at the Bridge
193S. Peer Counseling on Comprehensive Sexual Health
197. Education, Gender, and Development
199A,B,C. Undergraduate Honors Seminar
201. History of Education in the United States
202. Introduction to Comparative and International Education
204. Introduction to Philosophy of Education
208B. Curriculum Construction
218. Topics in Cognition and Learning: Play
220B. Introduction to the Politics of Education

220D. History of School Reform: Origins, Policies, Outcomes, and Explanations
221A. Policy Analysis in Education
243. Writing Across Languages and Cultures: Research on Writing and Writing Instruction
247. Moral Education
251B. Statistical Analysis in Educational Research: Analysis of Variance
270A. Learning to Lead in Public Service Organizations
288. Organization Studies: Theories and Analyses
298. Online Learning Communities
303X. Designing Learning Spaces
315X. Race and Ethnicity in Social Institutions
323A. Introduction to Education Policy Analysis
326. Legal Dilemmas and Administrative Decision Making in Schools
342. Child Development and New Technologies
354X. School-Based Decision Making
369. Human Cognitive Abilities
374A. Research Workshop: Knowledge Networks
382. Student Development and the Study of College Impact
384. Advanced Topics in Higher Education

HONORS PROGRAM IN EDUCATION

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 or practicum project in a related area of education.

Students apply for entry during the junior year. Applications are available at http://www.stanford.edu/dept/SUSE/honors. The current director of the program is Professor Francisco Ramirez. At least one course must be taken from each of the following areas:

1. *Educational policy and history in the U.S.*—EDUC 201, History of Education in the United States; EDUC 202, Introduction to the Study of International Comparative Education; EDUC 165, History of Higher Education in the U.S.
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 and the Status of Women: Comparative Perspectives.
3. *Foundational disciplines*—courses include: EDUC 110, Sociology of Education: Social Organizations of Schools; EDUC 204, Introduction to Philosophy of Education; EDUC 220, Social Sciences and Educational Analysis.

A directed reading course as well as directed research courses with a faculty member in Education are also required. Students in the program should enroll in 199A,B,C, Undergraduate Honors Seminar, during their senior year.

Near the end of Spring Quarter, candidates for honors orally present brief reports of their work and findings at a mini-conference. Honors students in Education are expected to attend this conference.

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. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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/suse. 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/suse/admissions/admissions-application-requirements.html#test-scores.

Other Divisions of the University—Teachers, administrators, and researchers are expected to have substantial knowledge of a variety of academic fields outside the areas encompassed by professional education. Graduate students in the School of Education are, therefore, urged to consider the courses offered in other schools of the University in planning their programs.

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 Assistant Director of Academic Services, located in 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
- Social Sciences in Education. Students may specialize in anthropology, economics, educational linguistics, history, philosophy or sociology of education, or interdisciplinary 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, 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 coterminal 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 School's doctoral programs office 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; click on the publication link.

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 (PSE)
Economics of Education (SSPEP)
Educational Linguistics (SSPEP)
Educational Psychology (PSE)
English Education/Literacy Studies (C&TE)
General Curriculum Studies (C&TE)
Higher Education (SSPEP)
History of Education (SSPEP)
International Comparative Education (SSPEP)
Learning Sciences and Technology Design (CTE, PSE, SSPEP)
Mathematics Education (C&TE)
Organization Studies (SSPEP)
Philosophy of Education (SSPEP)
Science Education (C&TE)
Interdisciplinary Studies (SSPEP)
History/Social Science Education (C&TE)
Sociology of Education (SSPEP)
Teacher Education (C&TE)

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: Hilary Beech (Administration), Laura L. Breyfogle (External Relations), Anthony J. DiPaolo (Stanford Center for Professional Development), Brad Osgood (Student Affairs), Channing Robertson (Academic and Faculty Affairs)
Associate Dean: Noé P. Lozano (Diversity Programs)
Assistant Dean: Sally Gressens (Graduate Student Affairs)
Faculty Teaching General Engineering Courses
Professors: Brian Cantwell, Mark R. Cutkosky, Charbel Farhat, Thomas Lee, Larry Leifer, Drew Nelson, Brad Osgood, Channing Robertson, Stephen M. Rock, Bernard Roth, Sheri Sheppard, Robert Sinclair, Simon Wong
Associate Professors: Samuel S. Chiu, Christopher Edwards, J. Christian Gerdes, Ashish Goel, Sanjay Lall, Paul McIntyre, Reginald Mitchell, Olav Solgaard, Benjamin Van Roy
Assistant Professors: Eric Darve, Sarah Heilshorn, Gianluca Iaccarino, Adrian Lew, Nicolas A. Melosh, Gunter Niemeyer, Beth Pruitt, Clifford L. Wang, Thomas A. Weber, Xiaolin Zheng
Acting Assistant Professor: Lisa Y. Hwang
Professors (Teaching): Thomas H. Byers, Robert E. McGinn
Associate Professor (Teaching): Mehran Sahami
Senior Lecturer: Claude Reichard
Lecturers: Steve Blank, Jerry Cain, Midge Eisele, David Jaffe, Vadim Khayms, Mary McDevitt, Lauren Rusk, Tina Seelig, Evelin Sullivan, Patrick Young, Julie Zelenski
Visiting Lecturer: Thomas Hurlbutt
Consulting Professors: Abbas Emami-Naeini, Thomas Kosnik
Consulting Associate Professor: Paul Mitiguy
Consulting Assistant Professor: William Behrman
Mail Code: 94305-4027
Phone: (650) 723-5984
Web Site: http://soe.stanford.edu

Courses offered by the School of Engineering have the subject code ENGR, and are listed in the "Engineering (ENGR) Courses" section of this bulletin.

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. We also have an exchange program available to selected 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. A hard copy version is also available from the Office of Student Affairs in Terman Engineering Center, room 201. Because it is published 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 Terman 201.

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 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 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 201 Terman. For more information, see the transfer credit section of the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu.

DEGREE PROGRAM OPTIONS

For more information about the requirements for the following options, see the "Undergraduate Degrees and Programs" section of this bulletin. 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, Terman 201, or with department contacts listed in the *Handbook for Undergraduate Engineering Programs,* available at http://ughb.stanford.edu.

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.

DUAL AND COTERMINAL DEGREE PROGRAMS IN THE SCHOOL OF ENGINEERING

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. Usually five years are needed for a combined program.

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, and (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, and (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.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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, 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 offer qualified majors 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.

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 including differential equations, an introduction to discrete mathematics, and an understanding of statistics and probability theory. The minimum preparation should normally include calculus to the level of MATH

53. Knowledge of ordinary differential equations and matrices is important in many areas of engineering, and students are encouraged to select additional courses in 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 30. Engineering Thermodynamics
ENGR 40. Introductory Electronics[1]
ENGR 50/50M. Introduction to Materials Science, Nanotechology Emphasis/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)

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*.

SCHOOL OF ENGINEERING MAJORS

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 eight 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; 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.

AERONAUTICS AND ASTRONAUTICS (AA)

Mathematics (24 units):	
MATH 53 *or* CME 102	5
MATH electives (see Basic Requirement 1)	
Science (18 units):	
PHYSICS 41. Mechanics	4
PHYSICS 43. Electricity and Magnetism	4
One additional Physics course	3
Science electives (see Basic Requirement 2)	9
Technology in Society (one course required; see Basic Requirement 4)	3-5
Engineering Fundamentals (three courses minimum; see Basic Requirement 3):	
ENGR 15. Dynamics	3
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[1]	6
Depth Area II[1]	6
Engineering Elective(s)[2]	3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

1 Two of the following areas:
Fluids (AA 200A, 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)

2 Electives are to be approved by the adviser, and might be from the depth area lists or courses such as AA 201A, 210B, 252; ENGR 206, 209A, 209B; or other upper-division Engineering courses.

ARCHITECTURAL DESIGN (AD)

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 100. Managing Sustainable Building Projects (WIM)	4
CEE 101A. Mechanics of Materials	4
CEE 110. Building Information Modeling	4
CEE 134B. Architecture Studio: Special Topics	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, 131A or 138A; and others from CEE 80N, 101B, 101C, 122A,B, 135A, 139, 154, 172A, 176A, 180, 181, 182, 183; ENGR 50; ME 101, 110A, 115, 120, , 222; ARTSTUDI 60, 70, 140, 145, 148, 271; ARTHIST 142, 143A; FILMPROD 114; DRAMA 137.

ATMOSPHERE/ENERGY (A/E)

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 *or* 45. Light and Heat — 4
- CHEM 31B. Chemical Principles II *or* CHEM 31X. Chemical Principles or ENGR 31 — 4
- 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 30. Engineering Thermodynamics — 3

Plus one of the following two courses plus one elective (see Basic Requirement 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 — 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* ME 70. Introductory Fluids Engineering — 4
- CEE 164. Introduction to Physical Oceanography — 4
- CEE 171. Environmental Planning Methods — 3
- CEE 172. Air Quality Management — 3
- CEE 172A. Indoor Air Quality (given alternate years) — 2-3
- CEE 178. Introduction to Human Exposure Analysis — 3
- EARTHSYS 111. Biology and Global Change — 3
- EARTHSYS 144. Fundamentals of GIS — 4
- EARTHSYS 147. Control Climate Change/21st. Cent (alt years) — 3
- EARTHSYS 184. Climate and Agriculture — 3
- GES 90. Introduction to Geochemistry — 3-4

Group B: Energy

- CEE 115. Goals and Methods for the Sustainable Design of Buildings — 3-4
- CEE 142A. Creating Sustainable Development — 3
- CEE 156. Building Systems — 4
- CEE 172P. Distrib Generation & Grid Integration — 3-4
- CEE 176A. Energy Efficient Buildings — 3-4
- CEE 176B. Electric Power: Renewables and Efficiency — 3-4
- CEE 176F. Energy Systems Field Trips (alt years) — 4
- CEE 177S. Design for a Sustainable World — 1-5
- EARTHSYS 45N. Energy Issues for the Pacific — 3
- EARTHSYS 101. Energy and the Environment — 3
- EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes — 3
- ENERGY 104. Technology in the Greenhouse — 3

These requirements are subject to change. The final requirements are published with sample programs in the *Handbook for Undergraduate Engineering Programs*.

BIOMECHANICAL ENGINEERING (BME)

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 core — 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. Strength of Materials and Lab — 4
- ME 389. Bioengineering and Biodesign Forum — 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):

- ME 281. Biomechanics of Movement — 3
- ME 284A. Cardiovascular Bioengineering — 3
- ME 284B. Cardiovascular Bioengineering — 3
- ME 280. Skeleton Development & Evolution — 3
- ME 294. Medical Device Design — 3
- ME 287. Soft Tissue Mechanics — 3

Additional courses, as needed or desired:

- BIO 44Y. Core Experimental Lab — 4
- BIO 112. Human Physiology — 4
- BIO 118. Genetic Analysis of Biological Processes — 5
- BIO 129A *or* B. Cellular Dynamics I *or* II — 4
- BIO 136. Evolutionary Paleobiology — 4
- HUMBIO 160. Human Behavioral Biology — 6
- SURG 101. Introduction to Surgery — 5

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 coursework 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)

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
  - MATH 51. Advanced Calculus
  - STATS 141. Biostatistics
  - CME 100. Vector Calculus for Engineers
- 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
- Simulation Electives (two courses)[5,6] — 6
- Informatics Electives (two courses)[5,6] — 6
- Simulation, Informatics, or Cell/Mol Elective (one course)[5,6] — 3

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, *or* CS 223B — 3
  - One additional course from the previous two lines — 3-4
- Informatics Electives (three courses)[5,6] — 9
- Cellular Electives (two courses)[5,6] — 6
- Organs Electives (two courses)[5,6] — 6

Organs/Organisms Concentration:
- Mathematics (one of the following courses):
  - MATH 51. Advanced Calculus — 5
  - STATS 141. Biostatistics — 5
  - CME 100. Vector Calculus for Engineers — 5
- One additional Engineering Fundamental[4] — 3
- Biology (three courses)
  - BIO 112. Human Physiology — 4
  - BIO 188. Biochemistry I *or* BIOE/RAD 220. Introduction to Imaging — 3
- Organs Elective[5,6] — 3-5
- Simulation Electives (two courses)[5,6] — 6
- Informatics Electives (two courses)[5,6] — 6
- Simulation, Informatics, or Organs Elective (one course)[5,6] — 3

Simulation Concentration:
- Mathematics:
  - MATH 51 *or* CME 100. Advanced Calculus I — 5
  - MATH 52 *or* CME 102/ENGR 155A. Advanced Calculus II — 5
  - MATH 53 *or* CME 104/ENGR 155B. Advanced Calculus III — 5
- Science:
  - PHYSICS 43 *or* 45 — 4
- Engineering Fundamental:
  - ENGR 30. Engineering Thermodynamics — 3
- Simulation Core:
  - Two courses from ENGR 14, ENGR 15; ME 80 — 6
- Simulation Elective (two courses)[5,6] — 6
- Cellular Elective (one course)[5,6] — 3
- Organs Elective (one course)[5,6] — 3

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. 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.

COMPUTER SYSTEMS ENGINEERING (CSE)

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 181, 191W, 194, 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 — 4
- EE 108B. Digital Systems II — 3 or 4
- Senior Project (CS 191, 191W, 194, 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 or CS 143. Compilers — 4
- 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 240E. Embedded Wireless Systems — 4
- CS 244. Advanced Topics in Networking — 4
- CS 244E. Low-Power 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 — 4
- ENGR 207A. Modern Control Design I — 3
- ENGR 207B. Modern Control Design 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 240X. Advanced Operating Systems II 3
CS 244. Advanced Topics in Networking 4
CS 244B. Distributed Systems 3
CS 244E. Low-Power Wireless Networking 3
CS 249A. Object-Oriented Programming 3
CS 249B. Advanced Object-Oriented Programming 3
EE 179. Intro to Communications 3
EE 276. 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).

ENGINEERING PHYSICS (EPHYS)

Mathematics (21 units minimum):
MATH 51, 52. Multivariable Calculus
or CME 100, 104. Vector Calculus, Linear Algebra, PDE 10
MATH 53 or CME 102. Ordinary Differential Equations 5
MATH 131. Partial Differential Equations 3
One math elective such as EE 261, PHYSICS 112, or CME 106 3-4
Science:
PHYSICS 41. Mechanics 4
PHYSICS 43/44. Electricity and Magnetism 5
PHYSICS 45/46. Light and Heat 5
PHYSICS 70. Foundations of Modern Physics 4
or
PHYSICS 61. Mechanics and Special Relativity 4
PHYSICS 63/64. Electricity, Magnetism, and Waves 5
PHYSICS 65/67. Thermodynamics and Modern Physics 6
Technology in Society (one course required; see Basic Requirement 4): 3-5
Engineering Fundamentals
(three courses minimum; CS 106X or B recommended) 9-11
Engineering Depth (core):
Intermediate Mechanics:
ENGR 15. Dynamics 3
or PHYSICS 110. Intermediate Mechanics 4
Intermediate Electricity and Magnetism:
EE 141,242. Eng. Electromagnetics, Electromagnetic Waves 7
or PHYSICS 120, 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 300G. Intro to Numerical Methods for Engineering 3
or PHYSICS 113. Computational Physics 4
Electronics Lab:
ENGR 40. Introductory Electronics 5
or EE 122. Analog Circuits Laboratory 3
or PHYSICS 105. Analog Electronics 3
or APPPHYS 207. Laboratory Electronics 3
Writing Lab:
EE 108A/ENGR 102E. Digital Systems I 4-5
or ME 203/ENGR 102M. Manufacturing and Design 4-5
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, 223. Applied Quantum Mechanics 6
or PHYSICS 130, 131. Quantum Mechanics 8
Thermodynamics and Statistical Mechanics:
PHYSICS 170, 171. Thermodynamics, Kinetic Theory, and Statistical Mechanics 8
Design Course (choose one of the following):
CS 108. Object-Oriented Systems Design 3-4
EE 133. Analog Communications Design Laboratory 3
EE 144. Wireless Electromagnetic Design Laboratory 3
ME 203. Manufacturing and Design 3-4
ME 210. 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:
MATSCI 151. Microstructure and Mechanical Properties 4
MATSCI 152. Electronic Materials Engineering 4
MATSCI 155. Nanomaterials Synthesis 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 194. Thermodynamics and Phase Equilibria 4
PHYSICS 172. Solid State Physics 3
or MATSCI 199. Electronic and Optical Properties of Solids 3
Electromechanical System Design:
ME 80. Strength of Materials 4
ME 112. Mechanical Engineering Design 4
ME 210. 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
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.

PRODUCT DESIGN (PD)

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 Science1 (7 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 or 50M, 60, 62

Product Design Engineering Depth (48 units):

ARTSTUDI 60. Design I: Fundamental Visual Language	3
ARTSTUDI 160. Design II: The Bridge	3
Two additional Art Studio courses (ARTSTUDI 70 recommended)	6
ENGR 14. Applied Mechanics	3
ENGR 102M. Technical/Professional Writing for ME Majors[3]	1
ME 80. Strength 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. Intro to Design Methods	3
ME 115B. Human Values in Design	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 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 the PSYCH elective.

3 Must be taken concurrently to fulfill the Writing in the Major requirement.

INDIVIDUALLY DESIGNED MAJORS IN ENGINEERING (IDMENS)

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, 50/50M, 60, 62, 70A, 70B, 70X). 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.

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 re-approved 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, Terman 201. An IDMEN cannot be a student's secondary major.

DEPARTMENTAL MAJORS IN THE SCHOOL OF ENGINEERING

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 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 2008-09 *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu for the most up-to-date listing of curricular requirements.

Experimentation—Departmental major programs, other than Computer Science and Management Science and 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*.

CHEMICAL ENGINEERING (CHE)

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 & 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 25/CHEMENG 25. Biotechnology	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 (WIM) 4
- CHEMENG 188. 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 (140 or 160 required):
  - CHEMENG 140. Microelectronics Processing Technology 3
  - CHEMENG 160. Polymer Science and Engineering 3
  - CHEMENG 174. Environmental Microbiology I 3
  - CHEMENG 189. Biochemistry II 3

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 sample programs in the *Handbook for Undergraduate Engineering Programs*. Handbooks are available at http://ughb.stanford.edu or from the department or school.

CIVIL ENGINEERING (CE)

- 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 Construction3 39-41
  - Other School of Engineering Electives 0-6

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 102 (or Math 53) and a Statistics class. Science must include PHYSICS 41, CHEM 31, two additional quarters in either chemistry or physics, and GES 1. For students in the Environmental and Water Studies track, CHEM 31B or X, and CHEM 33 are required. For students in the Structures and Construction track, CHEM 31A, CHEM 31X or ENGR 31 is required.

2 Environmental and Water Studies: ENGR 30; CEE 101D, 160, 161A, 166A, 166B, 171, 172, 177, 179A; and either CEE 169, 179B, or 179C. Remaining specialty units from: CEE 63, 64, 164, 166D, 169, 172A, 173A, 176A, 176B, 178, 179B or C, 199.

3 Structures and Construction: ENGR 50; CEE 102, 156, 180, 181, 182, 183. Remaining specialty units from: ENGR 15, CME 104; CEE 101D, 111, 122A,B, 140, 143, 147, 151, 154, 160, 161A, 171, 176A, 176B, 195A/B, 196, 199, 203, and one of 130, 134B, 136, or 137B.

COMPUTER SCIENCE (CS)

- 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 181, 191W, 194, 294W
- Computer Science Core (14 units):
  - CS 107. Computer Organization and Systems[6] 5
  - CS 110. Principles of Computer Systems[7] 5
  - CS 161. Data Structures and Algorithms 4
- Computer Science Depth[8] (choose one of the following tracks; 26 units minimum):
- *Artificial Intelligence Track—*
  - CS 221. Artificial Intelligence: Principles & Techniques 4
  - Choose two of: CS 223A, 223B, 224M, 224N, 226, 227, 228, 229 6-7
  - One additional course from the list above or the following: CS 205A, 222, 224S, 224U, 225A 225B, 227B, 262, 276, 277, 279, 321, 326A, 327A, 329 (with adviser consent), 374, 379 (with adviser consent); EE 263, 376A; ENGR 205, 209A; LINGUIST 180; 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[9], 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
  - One additional course from the lists above or the following: CS145, 147, 148 or 248 3-4
  - One course from either the general CS electives list[9] 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 248 5
  - One of[10]: 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 three additional courses from the lists above, the general CS electives list, 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 9-12
- *Human-Computer Interaction Track—*
  - CS 147, 247 8
  - One of: CS 148, 248, 376, 377, 378 3-5
  - One of: CS 108, 140, 221, 223B, 229, 249A 3-4
  - One of: PSYCH 55, 252; MS&E 184; ME 101, 115 3-6
  - Track Electives: at least two additional courses from the lists above (only one of CS 148 or 248 may be counted), the general CS electives list[9], or the following: ARTSTUDI 60; COMM 269; CME 340; CS 447 (with consent of undergraduate adviser), 448B (with consent of undergraduate adviser); LINGUIST 180; ME 118; MS&E 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, 240D, 245, 345, 346, 347
    - *Information Systems in Biology:* CS 262, 270, 274
    - *Information Systems on the Web:* CS 276, 364B
  - At least three additional courses from the above areas or the general CS electives list[9] 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, 155, 240, 240C, 240D, 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[9], or the following: CS 240E, 240X, 244C, 244E, 315A, 315B, 343, 344, 344E, 345, 346, 347, 349 (with consent of undergraduate advise), 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, 156, 157 or PHIL 151, 205A, 228, 242, 256, 259, 262, 354, 355, 357, 358, 359 (with consent of undergraduate adviser), 364A, 364B, 369 (with consent of undergraduate adviser), 374; MS&E 310	6-8
Track Electives: at least three additional courses from the list above, the general CS electives list[9], 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, 240D, 242, 244; EE 108B	3-4
One of: CS 121 or 221, 223A, 223B, 228, 229	3-4
One of: CS 145, 147, 148 or 248, 262	3-5
At least two courses from the general CS electives list[9]	6-8

Individually Designed Track—

Students may propose an individually designed track. Proposals should include a minimum of 7 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, 294, 294W[11]	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., 27 total units for track and elective courses).

2 Students who complete 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 156, 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 51 and CME 100, or MATH 103 and 113, or CS 157 and PHIL 151, may not be used in combination to satisfy the math electives requirement. 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 complete 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., 27 total units for track and elective courses).

8 Students must satisfy the requirements for any one track. Track requirements plus electives should include a minimum of seven courses and total at least 26 units.

9 General CS Electives: CS 108, 121 or 221, 124, 140, 142, 143, 144, 145, 147, 148 or 248, 154, 155, 156, 157 or PHIL 151, 164, 205A, 205B, 222, 223A, 223B, 224M, 224N, 224S, 224U, 225A, 225B, 226, 227, 228, 228T, 229, 240, 242, 243, 244, 244B, 245, 247, 249A, 249B, 255, 256, 257, 258, 261, 262, 270, 271, 272, 273A, 274, 276, 277, 295; CME 108; EE 108B, 282.

10 CS 205A is recommended in this list for the Graphics track. Students taking CME 104 are also required to take its prerequisite, CME 102.

11 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*.

ELECTRICAL ENGINEERING (EE)

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	4-5
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 or 275, 273, 282; CS 107

Computer Software: CS 107, 108, 194, or 244A; EE 284

Controls: ENGR 105, 205, 206 207A, 207B, 209A, 209B; EE 263

Circuits and Devices: EE 116, 122, 133, 212, 214, 215, 216, 271

Fields and Waves: EE 134, 141, 144, 241, 242, 246, 247, 252, 256

Communications and Signal Processing: EE 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, 144, 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.

ENVIRONMENTAL ENGINEERING (ENV)

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, 179B, or 179C	5
CEE Breadth Electives[3]	10
Other School of Engineering Electives	1-9

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 102 (or Math 53) and a Statistics course. Science must include PHYSICS 41; CHEM 31B or X, 33; and GES 1.

2 Should choose a class that specifically includes an ethics component, such as STS 101, 110, 115, CS 201, MS&E 181, MS&E 193, or POLISCI 114S.

3 Breadth electives currently include CEE 63, 101C, 164, 166D, 169, 172A, 173A, 176A, 176B, 178, 179B or C, and 199.

MANAGEMENT SCIENCE AND ENGINEERING (MS&E)

Mathematics (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 (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 3-5
  or ENGR 40. Introduction to Electronics
- Fundamentals Elective[4] 3-5

Engineering Depth (core): 22-29
- 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 five concentrations):[7] 20-30
- Financial and Decision Engineering Concentration: 27-29
  - 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 Mgmt 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
    - STATS 240. Statistical Methods in Finance 3-4
- 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
      - MS&E 134. Organizations and Info Systems[5] 3-4
      - MS&E 184. Technology and Work 3
      - MS&E 185. Global Work 4
      - MS&E 269. Quality Control and Management 3-4
    - Entrepreneurship and Innovation:
      - MS&E 140. Industrial Accounting 3-4
      - MS&E 266. Management of New Product Dev't 3-4
  - 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: 27-29
  - 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
    - MS&E 269. Quality Control and Management 4

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, COMM 169, CS 201, MS&E 181, MS&E 193 (WIM), STS 101/ENGR 130, STS 110/MS&E 197 (WIM), STS 115/ENGR 131, STS 160, STS 163, STS 170, STS 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)

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 50M. Intro to Materials Science, Biomaterials[1] 4
- At least two additional courses 6-8

Engineering Depth:
Choose four of the following lab courses:
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 & Devices Lab (WIM) 4
Materials Science Fundamentals[2] 24
Science and Engineering 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 courses are taken, one may be used for the MATSCI depth fundamentals requirement.

2 MATSCI Fundamentals; 24 units (6 courses) from ENGR 50 or 50M (alternatively, MATSCI 70N), 151,152, 153,154, 155, 156, 157, 190, 192, 193, 194, 195, 196, 197, 198, 199. The MATSCI 150 series is designed specifically for undergraduates and MATSCI 153, 154, 155, and 157 are strongly recommended. The 190-199 series represents more advanced courses.

3 MATSCI Options; 10 units from one of the following areas:

Bioengineering: BIOE 220, 222A, 222B, 281, 284A, 284B; MATSCI 380, 381; ME 80

Chemical Engineering: CHEM 171; CHEMENG 130, 140, 150, 160

Chemistry: CHEM 151, 153, 171, 173, 175

Electronics and Photonics: EE 101A, 101B, 102A, 102B, 116, 134, 136, 141

Energy Technology: EE 293A, 293B; MATSCI 302; ME 260

Materials Characterization Techniques: MATSCI 320, 321, 323, 325, 326, 405

Mechanical Behavior and Design: AA 240A, 240B, 256; MATSCI 198, 333, 358; ME 80 or CEE 101A, ME 203, 294

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)

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. Intro 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* 31A/B (required)
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 3-5
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 (WIM corequisite for ME 203) 1
ME 70. Introductory Fluids Engineering 4
ME 80. Strength 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 (WIM; must be taken concurrently with ENGR 102M) 4
Options to complete the ME depth sequence: Any two courses from those described in the ME Graduate Student Handbook as MS depth or breadth may be taken to complete the undergraduate major.

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) and Statistics (CME 106/ENGR 155C or STATS 110 or 116). Science: 21 units minimum and requires courses in Physics or Chemistry, with at least a full year in one or the other. CHEM 31A/B is considered one course. CHEM 31X is recommended.

2 ME majors must choose their TIS course from the following list: ME 190 (recommended; offered every other year), STS 101, 110, or CS 201.

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, Terman Engineering Center, room 201. 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; (4) 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)

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 200A. 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)

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. Microelectronics Processing Technology
or CHEMENG 150. Biochemical Engineering
or CHEMENG 160. Polymer Science and Engineering 3
CHEMENG 170. Kinetics and Reactor Design 3
CHEMENG 180. Chemical Engineering Plant Design 3
CHEMENG 185. Chemical Engineering Lab 4
CHEM 171. Physical Chemistry 3
ECON 150. Economic Policy Analysis 5
ECON 154. Economics of Legal Rules and Institutions 5

CIVIL ENGINEERING (CE)

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. 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. Students should recognize that 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, including example programs focusing on each of the areas of expertise listed above, is available at http://cee.stanford.edu/prospective/ug/minorCE.html. While each example program focuses on a different area of expertise within the department, other combinations of courses are also possible.

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. 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)

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):
CS 106A. Programming Methodology
and CS 106B (*or* X). Programming Abstractions (Accelerated) 5

Core:
CS 103. Mathematical Foundations of Computing[1] 5
CS 107. Computer Organization and Systems[2] 5
CS 109. Intro 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 3-4

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 3

Theory—
CS 154. Automata and Complexity Theory 4
CS 157. Logic and Automated Reasoning 3
CS 161. Design and Analysis of Algorithms 4

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 complete 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)

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)

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, including example programs focusing on each of the areas of expertise listed above, is available at http://cee.stanford.edu/prospective/ug/minorEnvE.html. While each example program focuses on a different area of expertise within the department, other combinations of courses are also possible.

General guidelines are:

1. 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.
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 Lynn Hildemann (hildemann@stanford.edu) is the CEE undergraduate minor adviser in Environmental Engineering. Students must consult with her in developing their minor program, and obtain approval of the finalized study list from her.

MANAGEMENT SCIENCE AND ENGINEERING (MS&E)

The following courses fulfill the minor requirements:

Background requirement:
MATH 51. Calculus

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	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)

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:

Fundamentals (choose one of the following):	
ENGR 50. Introduction to Materials Science, Nanotechnology Emphasis	4
ENGR 50M. Introduction to Materials Science, Biomaterials Emphasis	4
Materials Science Fundamentals and 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)

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. Strength 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, 43, 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. Strength 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

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.

Fellowships and Assistantships—Departments and divisions of the School of Engineering award graduate fellowships, research assistantships, and teaching assistantships each year.

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.

Registration—New graduate students should follow procedures for registration as listed in the University's quarterly *Time Schedule*. Adviser assignments can be obtained from department offices.

THE 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 55 areas of concentration. In 23 of these 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 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; write Durand Building, Room 300, Stanford, CA 94305-4036; or email scpd-registration@stanford.edu.

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 select 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 divisions of the school offer graduate curricula as follows.

Aeronautics and Astronautics
Bioengineering
Chemical Engineering
Civil and Environmental Engineering
Computational and Mathematical Engineering
Computer Science
Electrical Engineering
Engineering
Management Science and Engineering
Materials Science and Engineering
Mechanical Engineering

AERONAUTICS AND ASTRONAUTICS

The current research and teaching activities cover a number of advanced fields, with special emphasis on:

Active Noise Control
Aerodynamic Noise
Aeroelasticity
Aircraft Design, Performance, and Control
Applied Aerodynamics
Biomedical Mechanics
Computational Aero-Acoustics
Computational Fluid Dynamics
Computational Mechanics and Dynamical Systems
Control of Robots, including Space and Deep-Underwater Robots
Conventional and Composite Structures/Materials
Direct and Large Eddy Simulation of Turbulence
Distributed Control of Networks
High-Lift Aerodynamics
Hybrid Propulsion
Hypersonic and Supersonic Flow
Inertial Instruments
Multidisciplinary Design Optimization
Navigation Systems (especially GPS)
Networked and Hybrid Control
Optimal Control, Estimation, System Identification
Physical Gas Dynamics
Spacecraft Design and Satellite Engineering
Turbulent Flow and Combustion

BIOENGINEERING

Biomedical Computation
Biomedical Devices
Biomedical Imaging
Cardiovascular Engineering
Cell and Molecular Engineering
Mechanobiology
Musculoskeletal Engineering
Neuroscience 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 and Water Studies
  Environmental Engineering and Science
  Environmental Fluid Mechanics and Hydrology
Structural Engineering and Geomechanics
  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

Algorithmic Game Theory
Analysis of Algorithms
Artificial Intelligence
Automated Deduction
Autonomous Agents
Biomedical Computation
Compilers
Complexity Theory
Computational Biology
Computational Geometry
Computational Logic
Computational Physics
Computer Architecture
Computer Graphics
Computer Logic
Computer Security
Computer Vision
Cryptography
Database Systems
Design Automation
Digital Libraries
Distributed and Parallel Computation
Electronic Commerce
Enterprise Management
Formal Verification
Haptic Display of Virtual Environments
Human-Computer Interaction
Image Processing
Knowledge-Based and Expert Systems
Knowledge Representation and Logic
Machine Learning
Mathematical Theory of Computation
Multi-Agent Systems
Natural Language and Speech Processing
Networks, Internet Infrastructure, and Distributed Systems
Operating Systems
Parallel Computing
Programming Systems/Languages
Reasoning Under Uncertainty
Robotics
Robust System Design
Scientific Computing and Numerical Analysis
Sensor Networks
Ubiquitous and Pervasive Computing

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 unit of courses within the School of Engineering with numbers 200 or above in which the student receives letter grades; and (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 program within the school by application to the appropriate department.

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.

AERONAUTICS AND ASTRONAUTICS

Emeriti: (Professors) Peter Bradshaw, Arthur E. Bryson, Robert H. Cannon, I-Dee Chang, Chi-Chang Chao, Richard Christensen,* Daniel B. DeBra,* Erastus H. Lee, Jean Mayers, Bradford W. Parkinson,* J. David Powell,* Charles R. Steele, Stephen W. Tsai,* Milton D. Van Dyke, 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
Courtesy Professors: C.W. Francis Everitt, J. Christian Gerdes, Ronald K. Hanson, Lambertus Hesselink
Consulting Professors: Heinz Erzberger, G. Scott Hubbard, Belgacem Jaroux, Arif Karabeyoglu, Cynthia H. Null, Thomas H. Pulliam, Robert Twiggs, Stanley Weiss, Alan Weston, Gregory Zilliac
Consulting Assistant Professor: Steven Murray
Visiting Associate Professor: Dennis Akos

* Recalled to active duty.

Phone: (650) 723-3317
Web Site: http://aa.stanford.edu

Courses offered by the Department of Aeronautics and Astronautics have the subject code AA, and are listed in the "Aeronautics and Astronautics (AA) Courses" section of this bulletin.

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:
Active Noise Control
Aerodynamic Noise
Aeroelasticity and Flow Simulation
Aircraft Design, Performance, and Control
Applied Aerodynamics
Biomedical Mechanics
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
Inertial Instruments
Multidisciplinary Design Optimization
Navigation Systems (especially GPS)
Networked and Hybrid Control
Optimal Control, Estimation, System Identification
Physical Gas Dynamics
Spacecraft Design and Satellite Engineering
Turbulent Flow and Combustion

INSTRUCTION AND RESEARCH

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.

UNDERGRADUATE PROGRAMS IN AERONAUTICS AND ASTRONAUTICS

BACHELOR OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS

Although primarily a graduate-level department, Aeronautics and Astronautics offers both an undergraduate minor and an interdisciplinary program in Aeronautics and Astronautics (AA) leading to the B.S. degree in Engineering. For detailed information, see the "School of Engineering" section of this bulletin and the *Handbook for Undergraduate Engineering Programs*, available from the Office of the Dean of Engineering or 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.

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 4 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.

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 and a 3.4 is the minimum 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 200A, 200B, 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: 200A or 200B (if 210A was taken or waived in item 1); or 210A (if 200A or 200B 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, Charles Taylor
Assistant Professors: Zev David Bryant, Jennifer R. Cochran, Markus Wilard Covert, Karl Deisseroth, Andrew Endy, Kerwyn C. Huang, Christina D. Smolke
Courtesy Professors: Sanjiv Sam Gambhir, Michael T. Longaker
Courtesy Associate Professors: Jeffrey A. Feinstein, Garry E. Gold, Kim Butts Pauly
Affiliated Faculty: Atul J. Butte, Rebecca Fahrig, Stuart B. Goodman, Sarah Heilshorn, Ellen Kuhl, Marc E. Levenston, Craig Levin, Mark Musen, David S. Paik, Sylvia K. Plevritis, Terence Sanger, 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 have the subject code BIOE, and are listed in the "Bioengineering (BIOE) Courses" section of this bulletin.

The mission of the Department of Bioengineering is to create a fusion of engineering and the life sciences that promotes scientific discovery and the invention of new technologies and therapies through research and education. The department encompasses both the use of biology as a new engineering paradigm and the application of engineering principles to medical problems and biological systems. The discipline embraces biology as a new science base for engineering.

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 Allen Center for Integrated Systems, the William F. Durand Building for Space Engineering and Science, the William M. Keck Science Building, and the Richard M. Lucas Center for Magnetic Resonance Spectroscopy and Imaging.

The departmental headquarters is located 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.

UNDERGRADUATE PROGRAMS IN BIOENGINEERING

Although primarily a graduate-level department, pre-approved B.S. majors in Biomechanical Engineering and Biomedical Computation can be arranged through the School of Engineering. For detailed information, see the "School of Engineering" section of this bulletin and the *Handbook for Undergraduate Engineering Programs* at http://ughb.stanford.edu and available from the Office of the Dean of Engineering.

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. As Bioengineering does not currently offer an undergraduate program, the B.S. degree must be from another department. 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 units are 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 2, 2008. We require students interested in our coterminal degree to take the Graduate Record Examination (GRE); applications may be obtained at http://www.gre.org. New coterminal applications and procedures are now available on the Office of the University Registrar web site. Access the new application form, instructions, and supporting documents online 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.

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, we require that students have completed mathematics through multivariable calculus and differential equations, completed a series of undergraduate biology courses (equivalent to 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 2, 2008.

Further information and application forms for all graduate degree programs may be obtained from Graduate Admissions, the Registrar's Office, http://gradadmissions.stanford.edu.

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 (a) 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 and (b) 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 department listings for course descriptions.

COGNATE COURSES

BIOC 218. Computational Molecular Biology (Same as BIOMEDIN 231.)
BIOMEDIN 210. Introduction to Biomedical Informatics: Fundamental Methods (Same as CS 270.)
BIOMEDIN 217. Translational Bioinformatics (Same as CS 275.)
CHEMENG 450. Advances in Biotechnology
EE 369A. Medical Imaging Systems I
EE 369B. Medical Imaging Systems II
EE 369C. Medical Image Reconstruction
ME 280. Skeletal Development and Evolution
ME 287. Soft Tissue Mechanics
ME 381. Orthopaedic Bioengineering
ME 382A. Medical Device Design
ME 382B. 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 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 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 coursework 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.

CHEMICAL ENGINEERING

Emeriti: (Professors) Andreas Acrivos, Michel Boudart, George M. Homsy, Robert J. Madix
Chair: Gerald G. Fuller
Professors: Stacey F. Bent, Curtis W. Frank, Gerald G. Fuller, Chaitan Khosla, Channing R. Robertson, Eric S. G. Shaqfeh, James R. Swartz
Associate Professor: Zhenan Bao
Assistant Professors: Alexander R. Dunn, Thomas F. Jaramillo, Andrew J. Spakowitz, Clifford L. Wang
Courtesy Professors: Annelise E. Barron, Daniel Herschlag, Jeffrey R. Koseff, Robert M. Waymouth
Lecturers: Shari B. Libicki, Sara Loesch-Frank, John E. Moalli, Anthony Pavone
Acting Assistant Professor: Lisa Y. Hwang
Consulting Professors: Douglas C. Cameron, Jae Chun Hyun, Kay Kanazawa, Wolfgang Knoll, Jaan Noolandi, Conrad Schadt, Do Yeung Yoon
Visiting Professor: Subhash Risbud

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 have the subject code CHEMENG, and are listed in the "Chemical Engineering (CHEMENG) Courses" section of this bulletin.

Chemical engineers are responsible for the conception and design of processes involved in the production, transformation, and transport of materials and sources of energy. This activity begins with experimentation in the laboratory and is followed by implementation of the technology into full-scale production. The mission of the Department of Chemical Engineering at Stanford is to provide professional training, development, and education for the next generation of leaders in the chemical and biological sciences and engineering. A large number of industries depend on the synthesis and processing of chemicals, materials, and energy. In addition to traditional examples such as the chemical and energy industries, there are increasing opportunities in biotechnology, pharmaceuticals, electronic device fabrication and materials, and environmental engineering. Chemical and biological engineering is essential in these and other fields whenever processes involve the chemical, biological, or physical transformation of matter and energy.

Research investigations are currently being carried out in the following fields: applied statistical mechanics, biocatalysis, bioengineering, 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 181/281, 183/283, 355, 450, 454, 456, 457, and 458. 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 graduate programs for active Stanford students is by approval of an internal petition. All other students should go to http://gradadmissions.stanford.edu for general and departmental information about the requirements and processes for applying for admission to a graduate degree program.

UNDERGRADUATE PROGRAMS 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.

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

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 Chemical Engineering (CHEMENG) should consult the curriculum outlined in the "School of Engineering" section of this bulletin. Courses taken to fulfill requirements (math; science, technology and society; engineering fundamentals; and engineering depth) must be taken for a letter grade if this option is offered.

There are several sample 4-year sequences of courses leading to a B.S. in Chemical Engineering. While each sequence starts at a different level, based on the student's prior preparation, all complete the major at the same level. Sample programs are available from the department's student services and faculty advisers for undergraduates, the Office of Student Affairs in the School of Engineering, and in the *Handbook for Undergraduate Engineering Programs,* available at http://ughb.stanford.edu. It is recommended that students discuss their prospective programs with chemical engineering advisers, especially if transferring from biology, chemistry, physics, or another engineering major. With advance planning, students can usually arrange to attend one of the overseas campuses.

For information about the requirements for a Chemical Engineering minor, see the "School of Engineering" section of this bulletin.

HONORS PROGRAM

The Department of Chemical Engineering offers a program leading to a Bachelor of Science in Chemical Engineering with honors. Qualified undergraduate majors conduct independent study and research at an advanced level with a faculty mentor, graduate students, and fellow undergraduates. This three-quarter sequential program involves research study in an area proposed to and agreed to by a Department of Chemical Engineering faculty adviser; concurrent participation each quarter in the CHEMENG 191H seminar; completion of a faculty-approved thesis; and participation in the Chemical Engineering Honors Symposium held annually during 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. Declared Chemical Engineering students 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 a research thesis adviser and a second faculty reader. The faculty adviser or, alternatively, a faculty sponsor must be a member of the Department of Chemical Engineering. Students should start their research in their junior year and are encouraged to consider incorporating research opportunities such as those sponsored by Undergraduate Advising and Research (see http://urp.stanford.edu/StudentGrants) into their honors research proposal. See departmental student services (Keck room189) 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 should:

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 total 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 faculty's discretion, at a comparable public event.
5. Submit final drafts of a thesis simultaneously to the adviser and reader and, if appropriate, to the Chemical Engineering faculty sponsor, no later than May 1, or the first day of the second month 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 third week of May, or the second month of the graduation quarter.
7. Submit five (5) final copies of the honors thesis as approved by the appropriate faculty. Include in each copy an original, completed, faculty signature sheet. The deadline is May 18, 2009, or the Monday at the beginning of the fourth week of the second month of the graduation quarter.
8. Submit one copy of thesis in electronic format to student services.

COTERMINAL BACHELOR'S AND MASTER'S DEGREES

Undergraduates with strong academic records may apply to study for a master's degree while completing their bachelor's degree(s). Further details are in the "Undergraduate Degrees" section of this bulletin. Interested students should discuss their educational goals with their faculty advisers and departmental student services.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN CHEMICAL ENGINEERING

The University's requirements, including residency requirements, for the M.S., Engineer, and Ph.D. degrees are outlined 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, protein biotechnology, renewable fuels, semiconductor processing, semiconcutor processing, soft materials science, solar utilization, surface and interface science, and transport mechanics.

Fellowships and Assistantships—Qualified applicants are encouraged to apply for predoctoral competitive fellowships, for example, those from the National Science Foundation. Applicants to the Ph.D. program should consult with their financial aid officers for information and applications. Matriculated Ph.D. students are primarily supported by fellowship awards and assistantship appointments. Assistantships are a paid position 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. All students are encouraged to apply for external, competitive fellowships and may obtain information about various awarding agencies from faculty advisers and student services. In the absence of other awards, incoming Ph.D. students normally are awarded departmental fellowships in the spring, prior to matriculation the following academic year.

MASTER OF SCIENCE IN CHEMICAL ENGINEERING

An M.S. program comprising appropriate course work is available to accommodate students wishing to obtain further academic preparation, after receiving a B.S. degree, before pursuing a professional chemical engineering career. This degree is not a prerequisite for nor does it lead directly into the department's Ph.D. program. For conferral of an M.S. degree, a formal thesis is not required, but the following departmental requirements must be met.

Unit and Course Requirements—For students terminating their graduate work with the M.S. degree in Chemical Engineering, a graduate-level, thematic program consisting of a minimum of 45 units of academic work is required, including (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, for terminal M.S. degree students, 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 for terminal M.S. students is an up-to-six-units combination of research units and no more than 3 units of 459 or other 1- or 2-unit graduate seminar courses in other departments, 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 all M.S. candidates, students who first matriculate at Stanford at the graduate level must (a) submit during the first quarter, no later than the ninth week, an adviser-approved Program Proposal for a Master's Degree form to departmental student services for review by the department chair, and (b) obtain approval from the M.S. adviser and the department chair for any subsequent program change or changes. 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 15 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 degree in Chemical Engineering. All M.S. programs must be reviewed and given final approval by the Chemical Engineering M.S. adviser and the department chair no later than the quarter before the quarter of M.S. 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 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. adviser on the choice of research adviser in advance of the quarter(s) of research, and, upon approval, then enroll in the appropriate section of CHEMENG 600. A written report describing the results of the research undertaken 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 required to enter the Ph.D. program.)

Unit and Course Requirements—A minimum of 90 total units (including research) within which 45 units of lecture course work is required for the Engineer degree, including (1) 300, 310A, 340, 345, 355 and (2) 3 units of 699. The remaining lecture courses, to total at least 45 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 adviser and the department chair. An aggregate of 6 units maximum of the required 45-unit minimum of course work may include such courses as 459 and 699. Students seeking the Engineer degree may 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 inform student services of meeting dates.

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 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 Engineer research work for the purpose of qualifying for the Ph.D. degree. If the request is granted, the student's thesis must have been approved by the reading committee and be available in its final form for inspection by the entire faculty at least two weeks prior to the scheduled date of the 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 an 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: 300, 310A, 340, 345, and 355, plus two courses in the 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 chair. The remaining lecture courses may be chosen from graduate-level science and engineering lecture courses in any department and, by petition to the chair, from upper-division undergraduate lecture courses in the sciences and engineering. Three units of 699 may be included in the required 45 units of lecture courses. Additionally, 1, 2, or 3 units of seminar courses such as 459 may be substituted for up to 3 units of the lecture course work requirement, 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 have the option of petitioning for a M.S. degree program to be added to their graduate record. When the petition is approved, students may apply 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 time limit 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 may be allowed 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 examinations must promptly submit Application for Candidacy for Doctoral Degree forms approved by their research advisers and at the same time establish and meet with their doctoral dissertation reading committees.

Reading Committee Requirement—All Ph.D. candidates are required to assemble reading committees and to have an initial committee meeting 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 entire reading committee as a group. It is the student's responsibility to schedule committee meetings and to report the meeting dates to the student services manager.

Teaching Requirement—Teaching experience is considered an essential component of doctoral training. 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 department, students are expected to have fulfilled all the requirements for this degree, including the completion of dissertations approved by their research advisers. 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, students may schedule University oral examinations. The 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 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.

COGNATE COURSES FOR ADVANCED DEGREES IN CHEMICAL ENGINEERING

In addition to elective CHEMENG graduate courses in the 200 and 400 series, the following is a list of frequently selected elective courses in other departments by students pursuing advanced degrees in chemical engineering. The list is divided 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) (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 (for example, 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 (for example, 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 (for example, with CHEMENG 260, 442, 460, 461, 464, 466)—
MATSCI 210. Organic and Biomaterials (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 (for example, 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)

PH.D. MINOR IN CHEMICAL ENGINEERING

A Ph.D. minor is a program outside a student's Ph.D. department. 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 reading committee meetings start in the second year of graduate study. In addition, 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 in the 20-unit minimum any 1-2 unit courses in Chemical Engineering. The list of courses must form a coherent program and must be approved by the minor program adviser and the chair of the department. All courses for the minor must be taken for a letter grade, and a GPA of at least 3.0 earned for these courses.

CIVIL AND ENVIRONMENTAL ENGINEERING

Emeriti: (Professors) James Douglas, John W. Fondahl, 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,* Paul M. Teicholz
Chair: Richard G. Luthy
Associate Chair: Gregory G. Deierlein
Professors: Ronaldo I. Borja, Craig S. Criddle, Gregory G. Deierlein (on leave Spring), Martin A. Fischer, Mark Z. Jacobson, Anne S. Kiremidjian, Peter K. Kitanidis, Jeffrey R. Koseff, Kincho H. Law, James O. Leckie, Raymond E. Levitt, Richard G. Luthy, Stephen G. Monismith, Leonard Ortolano (on leave Autumn), Alfred M. Spormann (on leave Autumn)
Associate Professors: Sarah L. Billington (on leave Autumn, Winter, Spring), David L. Freyberg, Lynn M. Hildemann, Eduardo Miranda
Assistant Professors: Jack W. Baker, Alexandria B. Boehm, Jennifer Davis, Oliver B. Fringer, John R. Haymaker, Michael D. Lepech
Professor (Research): Martin Reinhard
Courtesy Professors: Peter M. Pinsky, David D. Pollard, Stephen H. Schneider, George S. Springer
Courtesy Assistant Professor: Margot G. Gerritsen
Lecturers: John H. Barton II, Cathrine D. Blake, Antonio Caliz, Stan Christensen, Derek Fong, Renate Fruchter, Robert R. Groves, Andrew G. Hudacek, David Johnson, Matthew Johnson, Glenn Katz, Jonghoon Kim, Nelson A. Koen Cohen, Eric Kolderup, Royal Kopperud, Cynthia J. Krieger, Mark R. Kroll, John Kunz, Michael T. Lin, Ryan J. Orr, Tim J. Redd, Alexander P. Robertson, Peter Rumsey, Scott Summit, Jeff Till, Patxi Uriz, Joe Valerio, Patti J. Walters (on leave Autumn), Matthew Winkelstein
Consulting Professors: James E. Cloern, Russell G. Clough, Curtis R. Cook, Angelos N. Findikakis, Amatzia Genin, Robert F. Hickey, Michael C. Kavanaugh, Michael E. London, Francis L. Ludwig, Douglas M. MacKay, Martin W. McCann, Jr., Richard L. Meehan, 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: Olaf A. Cirpka, Edward S. Gross, Charles S. Han, Thomas L. Holzer, Jonathan G. Koomey, Lisa V. Lucas, Colin Ong, Adina Paytan, Joel N. Swisher, Jie Wang, Jane Woodward
Consulting Assistant Professors: Cristina L. Archer, William J. Behrman, John Chachere, Calvin K. Kam, Neil E. Klepeis, Gloria T. Lau, Michael L. MacWilliams, Pooya Sarabandi
Shimizu Visiting Professors: Nick Jenkins, Jonathan G. Koomey
UPS Visiting Associate Professor: Witold J. Henisz

* Recalled to active duty.

Department Offices: Yang and Yamazaki (Y2E2), rooms 314/316
Mail Code: 94305-4020
Phone: (650) 723-3074; Fax: (650) 725-8662
Web Site: http://cee.stanford.edu

Courses offered by the Department of Civil and Environmental Engineering have the subject code CEE, and are listed in the "Civil and Environmental Engineering (CEE) Courses" section of this bulletin.

The primary mission of Civil and Environmental Engineering (CEE) at Stanford is the execution of basic and applied research that advances the civil and environmental engineering professions, the education of future academic and industry leaders, and the preparation of 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, increasingly in more efficient and renewable ways.

The department focus is on the theme of engineering for sustainability, including three focus 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. Built environment research and teaching is conducted primarily within the programs of Construction Engineering and Management, Design-Construction Integration, and Structural Engineering and Geomechanics and Sustainable Design Construction. 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. Water environment research and teaching is conducted primarily within the programs of Environmental Engineering and Sciences and Environmental Fluid Mechanics and Hydrology. 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.

UNDERGRADUATE PROGRAMS IN CIVIL AND ENVIRONMENTAL ENGINEERING

The undergraduate Civil Engineering major provides a pre-professional program balancing the fundamentals common to many special fields of civil engineering with a field of study in Environmental and Water Studies or Structures and Construction. The undergraduate Environmental Engineering major offers a more focused program in Environmental and Water Studies. Laboratory facilities are available to students in building energy, construction, environmental engineering and science, experimental stress analysis, fluid mechanics, structural and earthquake engineering, and advanced sensing technologies. The department hosts the School of Engineering pre-approved majors in Architectural Design and Atmosphere/Energy; see requirements in the "School of Engineering" section of this bulletin.

At least one year of graduate study is recommended for professional practice. Students who contemplate advanced study at Stanford should discuss their plans with their advisers in the junior year. The coterminal B.S.-M.S. program should be considered by students who want an integrated five-year program; applications are considered once a year near the beginning of Winter Quarter.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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 under Undergraduate Programs in the "School of Engineering" section of this bulletin. 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 minor programs in Civil Engineering and 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. Further details on minors are provided in the "School of Engineering" section of this Bulletin.

GRADUATE PROGRAMS IN CIVIL AND ENVIRONMENTAL ENGINEERING

The Department of Civil and Environmental Engineering (CEE), in collaboration with other departments, offers eight graduate degrees structured in three degree programs described below. The Atmosphere/Energy Program offers degrees with that designation. The Built Environment Program offers degrees with five designations: Construction Engineering and Management, Design/Construction Integration, Geomechanics, and Structural Engineering and Sustainable Design Construction. The Environmental and Water Studies Program offers degrees with two designations: Environmental Engineering and Science, and Environmental Fluid Mechanics and Hydrology. The final portion of this section describes University and departmental requirements for graduate degrees.

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.

University Requirements—The University requirements governing the M.S., Engineer, and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

Admission—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.

Financial Assistance—The department maintains a continuing program of financial aid for graduate students. Applications for financial aid and assistantships should be filed by December 16, 2008; it is important that Graduate Record Examination scores be available at that time. Applicants not requesting financial assistance have until March 17, 2009 for the online submission.

Teaching assistantships carry a salary for as much as one-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. Assistantships and other basic support may be supplemented by fellowship and scholarship awards or loans. 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 projects.

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 Civil and Environmental Engineering 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 more information regarding the Honors Cooperative Program, see the "School of Engineering" section of this bulletin.

PROGRAMS OF STUDY IN CIVIL AND ENVIRONMENTAL ENGINEERING

ATMOSPHERE/ENERGY

Energy and Atmosphere are linked in two primary ways. First, fossil-fuel derived energy use contributes to air pollution and climate change. Second, atmospheric winds and solar radiation are major sources of renewable energy. Because atmospheric problems can be mitigated best by increasing the efficiency with which energy is used, optimizing the use of natural energy resources, and understanding the effects of energy technologies on the atmosphere, the areas of Energy and Atmosphere are naturally coupled together.

Students in this program receive a transcript designation of Atmosphere/Energy. Courses include those in energy resources, indoor and outdoor air pollution, energy efficient buildings, climate change, renewable energy, weather and storm systems, energy technologies in developing countries, energy systems, and air quality management.

Current research in the program includes projects on wind energy distribution and statistics, indoor exposure to air pollutants, the effects of a hydrogen economy on atmospheric pollution and climate, measurements of particulate matter and vehicle exhaust, hydrogen and other fuel generation by bacteria, numerical modeling of the effects of vehicles and power plants on climate, numerical weather prediction, improving the energy efficiency of buildings, improving the links between wind farms and the transmission grid, and studying the effects of aerosol particles on UV radiation and climate, among others.

Within the department, the program links to studies of water quality, environmental biotechnology, environmental fluid mechanics, sustainable construction, green buildings, and risk management. Outside the department, it links to Earth Systems, Management Science and Engineering, Mechanical Engineering, Energy Resources Engineering, Urban Studies, Aeronautics and Astronautics, and Biology, among others. In addition, the program has natural connections with the Woods Institute for the Environment, the Interdisciplinary Graduate Program in Environment and Resources (IPER), and the Global Climate and Energy Program (GCEP).

SUSTAINABLE BUILT ENVIRONMENT

The Sustainable Built Environment group in the department includes faculty from structural engineering and geomechanics, construction engineering and management, and design-construction integration. Our focus is on educating practitioners and researchers who can play a variety of roles in planning, designing, building and operating more sustainable buildings and infrastructure. The Structural Engineering and Geomechanics (SEG) program educates designers 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 life-cycle economic value of facilities. The Construction Engineering and Management (CEM) program 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 that we call "Virtual Design and Construction". The Design-Construction Integration (DCI) program combines courses from CEM and SEG, along with additional DCI courses, to educate professionals for design construction firms that provide integrated design-build project delivery, construction management and pre-construction services. Our new program (starting in 2008-2009) in Sustainable Design and Construction (SDC) expands the breadth of the DCI program with courses in sustainable, multi-stakeholder design methods and tools that incorporate lifecycle cost analysis, green architectural design, lighting and energy analysis, to educate students from a variety of undergraduate backgrounds interested in promoting more sustainable development of buildings and infrastructure. Each program offers MS, Engineer and Ph.D degrees. Admissions 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) program 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 concentration 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 INTEGRATION

The Design-Construction Integration (DCI) program prepares students for multidisciplinary collaborative teamwork in an integrated design and construction process. The program 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 field of study 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) program encompasses teaching and research programs 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 programs prepare 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 materials and materials targeting a reduced environmental impact.

Earthquake engineering and structural dynamics addresses earthquake phenomena, ground shaking, and the behavior, analysis, and design of structures under seismic and other dynamic forces. The John A. Blume Earthquake Engineering Center conducts advanced analytical and experimental research in earthquake engineering and houses static and dynamic testing equipment including two shaking tables. 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. The geomechanics program focuses on the application of the principles of applied mechanics to problems involving geologic materials and includes theoretical soil and rock mechanics, computational methods, and analysis and design of foundations and earth structures.

SUSTAINABLE DESIGN AND CONSTRUCTION

The Sustainable Design and Construction (SDC) program prepares students for careers in planning, designing, building and operating sustainable buildings and infrastructure to maximize their life-cycle economic value, their net contribution to environmental functions and services, and their social equity. The program offers courses in: project finance; sustainable multidisciplinary, multi-stakeholder planning and design processes; 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 program. This degree program is being launched in 2008-2009 and 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.

ENVIRONMENTAL AND WATER STUDIES

Environmental and water studies include environmental engineering and science, environmental fluid mechanics, environmental planning, and hydrology. Course offerings permit intensive 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 these 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 programs, environmental engineering and science, and environmental fluid mechanics and hydrology, are described below. Admissions to these programs are handled separately; prospective students should indicate their preference on their application.

ENVIRONMENTAL ENGINEERING AND SCIENCE

The Environmental Engineering and Science (EES) program 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) program focuses on understanding the physical processes controlling the movement of mass, energy, and momentum in the water environment and the atmosphere. The program also considers 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.

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, and 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. 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.

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), Gunnar Carlsson (Mathematics), Persi Diaconis (Mathematics, Statistics), David Donoho (Statistics), Charbel Farhat (Mechanical Engineering), Peter Glynn (Management Science and Engineering), Leonidas Guibas (Computer Science), Pat Hanrahan (Computer Science, Electrical Engineering), Jerry Harris (Geophysics), Antony Jameson (Aeronautics and Astronautics), Peter Kitanidis (Civil and Environmental Engineering), Sanjiva Lele (Mechanical Engineering, Aeronautics and Astronautics), Parviz Moin (Mechanical Engineering), Brad Osgood (Electrical Engineering), George Papanicolaou (Mathematics), Peter Pinsky (Mechanical Engineering), Eric Shaqfeh (Chemical Engineering, Mechanical Engineering), 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), Ashish Goel (Management Science and Engineering), Charles Taylor (Bioengineering), Benjamin Van Roy (Management Science and Engineering), Andras Vasy (Mathematics)
Assistant Professors: Eric Darve (Mechanical Engineering), Oliver Fringer (Civil and Environmental Engineering), Margot Gerritsen (Energy Resources Engineering), Gianluca Iaccarino (Mechanical Engineering), Ramesh Johari (Management Science and Engineering), Adrian Lew (Mechanical Engineering), Heinz Pitsch (Mechanical Engineering), Amin Saberi (Management Science and Engineering)
Professors (Research): Walter Murray (Management Science and Engineering), Arogyaswami Paulraj (Electrical Engineering), Michael A. Saunders (Management Science and Engineering)
Acting Assistant Professor: James Lambers (Energy Resources Engineering)

Consulting Professors: Sepandar Kamvar, Vadim Khayms, Pat Langley, Pat Miller

Web Site: http://icme.stanford.edu
Mail Code: 94305-4042
Phone: (650) 736-9038

Courses offered by the Institute for Computational and Mathematical Engineering have the subject code CME, and are listed in the "Computational and Mathematical Engineering (CME) Courses" section of this bulletin.

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 13, 2009. See http://icme.stanford.edu/admissions for up-to-date information including departmental deadlines. See http://gradadmissions.stanford.edu for information and application materials.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 breadth of 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 foundational breadth of knowledge. The elective course list represents automatically accepted electives within the program but is 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 214A. Numerical Methods in Fluid Mechanics
   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
   CME 324. Advanced Methods in Matrix Computation
   CME 340. Large-Scale Data Mining
   CME 342. Parallel Methods in Numerical Analysis
   CME 380. Constructing Scientific Simulation Codes
3. *Computer Science:*
   CS 205. Mathematical Methods for Robotics, Vision, and Graphics
   CS 164. Computing with Physical Objects: Algorithms for Shape and Motion
   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 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 364. Convex Optimization
   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 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. *Mechanical Engineering:*
   ME 335A,B,C. Finite Element Analysis
   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
7. *Statistics:*
   STATS 208. Introduction to the Bootstrap
   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
8. *Other:*
   CEE 281. Finite Element Structural Analysis
   CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods
   ENGR 209A. Analysis and Control of Nonlinear Systems
   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

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 student's professional development and research interests.

Requirement 5—3 units of an iCME graduate seminar or other approved seminar.

DOCTOR OF PHILOSOPHY IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

Applications to the Ph.D. program and all required supporting documents must be received by December 16, 2008. See http://icme.stanford.edu /admissions for up-to-date 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 year 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 but is 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 elective
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.

Elective List—See requirement 1b above.

CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods
CS 221. AI: Principles and Techniques
CS 228. Probabilistic Models in AI
CS 229. Machine Learning
CS 268. Geometric Algorithms
CS 348A. Computer Graphics: Geometric Modeling
EE 256. Numerical Electromagnetics
EE 363. Linear Dynamical Systems
EE364A,B. Convex Optimization I,II
EE 368. Digital Image Processing
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. Finite Element Analysis
ME 335C. Introduction to Boundary Element Analysis
ME 351A/B. Fluid Mechanics
ME 361. Turbulence
ME 408. Spectral Methods in Computational Physics
ME 412. Engineering Functional Analysis and Finite Elements
MS&E 238. Network Structures and Analysis
MS&E 319. Approximation Algorithms
MS&E 336. Topics in Game Theory with Engineering Applications
STATS 360B. Methods of Applied Statistics

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 provides 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 unduplicated units in the program. 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 their primary Ph.D. adviser.

COMPUTER SCIENCE

Emeriti: (Professors) Tom Binford, Edward Feigenbaum, Richard Fikes, Donald E. Knuth,* John McCarthy, Edward J. McCluskey, William F. Miller, Nils J. Nilsson, Vaughan Pratt,* Jeffrey D. Ullman, Gio Weiderhold*
Chair: William J. Dally
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, Zohar Manna, John Mitchell, Rajeev Motwani, Kunle Olukotun, Yoav Shoham, Sebastian Thrun, Jennifer Widom, Terry Winograd
Associate Professors: Serafim Batzoglou, Dawson Engler, Ronald P. Fedkiw, Michael Genesereth, Christopher Manning, David Mazieres, Nick McKeown, Serge A. Plotkin, Balaji Prabhakar, Mendel Rosenblum
Assistant Professors: Gill Bejerano, Jeffrey Heer, Scott Klemmer, Vladlen Koltun, Christoforos Kozyrakis, Philip Levis, Andrew Ng, Tim Roughgarden
Professors (Research): John Ousterhout, John K. Salisbury
Professor (Teaching): Eric S. Roberts
Associate Professor (Teaching): Mehran Sahami
Courtesy Professors: Russ Altman, Bernd Girod, Teresa Meng, Mark Musen, Fouad A. Tobagi
Courtesy Associate Professors: Ashish Goel, Dan Jurafsky, Benjamin Van Roy
Courtesy Assistant Professors: Atul Butte, Ramesh Johari
Lecturers: Gerald Cain, Nicholas J. Parlante, Robert Plummer, Patrick Young, Julie Zelenski
Consulting Professors: Gary Bradski, Kathleen Fisher
Consulting Associate Professor: Pei Cao
Consulting Assistant Professors: Kurt Akeley, Federico Barbagli
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 have the subject code CS, and are listed in the "Computer Science (CS) Courses" section of this bulletin.

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 Systems (ITS) and the School of Engineering (SoE).

UNDERGRADUATE PROGRAMS IN COMPUTER SCIENCE

The mission of Stanford's undergraduate program in Computer Science is to provide a foundation of mathematics, science, and engineering knowledge. Building on Stanford's core ideals of liberal education, the program combines fundamentals with practical experience in problem solving, programming, communication, and collaboration, allowing each student to realize his or her individual potential.

Graduates of the program are prepared to pursue graduate study at the highest academic level, or advance into leadership positions in industry. The program creates an atmosphere that promotes innovative thinking, values mutual respect and diversity, supports scholarship and research, instills ethical behavior, and cultivates lifelong learning.

The department offers both a major and a minor in Computer Science. The requirements for these programs are outlined in the "School of Engineering" section of this bulletin and described in more detail 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 (also 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) offers 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, 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 also 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.

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.

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 in a subsequent section.

Applications for admission to the M.S. program, and all of the required supporting documents, must be received by December 9, 2008. Exceptions are made for applicants who are already students at Stanford and are applying to the coterminal program. Information on these deadlines is available from the department.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 21 units of courses from those listed below in Requirements 1 and 2. Thus, students needing to take more than seven of the courses listed in Requirements 1 and 2 actually complete more than 45 units of course work in this program. Only well-prepared students may expect to finish the program in one year; most 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 of the courses in Requirement 2.

Requirement 1—The following courses may be needed as prerequisites for other courses in the program: CS 103, or 103A, B, or X, 106A, B, or X, 107, 108, 110; MATH 104.

Requirement 2—Students must demonstrate breadth of knowledge in the field by completing the following courses:

1. Area A: Mathematical and Theoretical Foundations
   a. Required:
      1. Statistics (CS 109 *or* STATS 116 *or* MS&E 220 *or* CME 106)
      2. Algorithms (CS 161)
      3. Automata (CS 154)
   b. Choose one of:
      1. Numerical Analysis (CME 108 *or* 302)
      2. Logic (CS 156, 157, 258, *or* PHIL 251)
      3. Mathematical Methods (CS 205A)
2. Area B: Computer Systems
   a. Required: Architecture (EE 108B *or* 282)
   b. Choose two of:
      1. Operating Systems (CS 140)
      2. Compilers (CS 143)
      3. Introduction to Computer Networks (CS 144 *or* EE 284)
3. Area C: AI and Applications
   a. Choose two of the following, with at least one 200-level course:
      1. AI (CS 121 *or* 221)
      2. Databases (CS 145 *or* 245)
      3. Graphics (CS 148 *or* 248)

Individual specializations may narrow the set of choices in specific areas of the breadth requirement; see the individual specialization sheets at http://cs.stanford.edu/degrees/mscs/programsheets for details. Breadth courses 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. Breadth 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.

Requirement 3—At least 1 but no more than 3 units of 500-level seminars must be taken.

Requirement 4—A program of 21 units in an area of specialization must be completed. All courses in this area must be taken for letter grades. Ten approved programs are listed below. Students may propose to the M.S. program committee other coherent programs that meet their goals and satisfy the basic requirements.

1. Artificial Intelligence
   a. at least four of: CS 223A, 223B, 224M, 224N, 224S, 224U, 226, 227, 228, 229
   b. a total of 21 units from category (a) and the following: CS 205A, 222, 225A, 225B, 227B, 228T, 256, 262, 270, 273A, 274, 275, 276, 277, 278, 279, 294A, 321, 327A, 328, 329, 374, 377,* 379*; ECON 286; EE 263, 376A; ENGR 205, 209A; LINGUIST 180; MS&E 251, 252, 339, 351, 352, 353; PSYCH 202, 205; STATS 202, 315A, 315B
2. Biocomputation
   a. at least four of: CS 262, 270, 272, 273A, 274, 278, 279
   b. a total of 21 units from category (a) and the following: CS 228, 229, 245, 261, 268, 275, 277, 345, 346, 365, 374; BIOC 218; BIOMEDIN 234; GENE 203, 211; SBIO 228
3. Computer and Network Security
   a. CS 155, 244, 255
   b. at least three of: CS 240, 244B, 244C, 259, 261, 340, 344, 365
   c. at least one additional course chosen from (b) and the following: CS 240E, 244E, 245, 295, 344B, 345, 347, 355, 361A; EE 384A, 384B, 384C, 384M, 384S
4. Database Systems
   a. CS 245
   b. at least two of: CS 345, 346, 347
   c. at least four additional courses from category (b) and the following: CS 240, 242, 243, 244, 244B, 244C, 249A, 249B, 255, 262, 270, 271, 272, 275, 276, 315A, 321, 344, 364B, 374
5. Human-Computer Interaction
   a. CS 147, 247
   b. at least one of: ME 101, 115; MS&E 284; Psych 205, 252
   c. at least two of: CS 148 or 248, 294H, 376, 377 (may be repeated for credit), 378, 447; COMM 207, 268, 269; EDUC 124; MUSIC 250A; SYMBSYS 145
   d. a total of 21 units from categories (a), (b), (c), and the following: CS 221, 223B, 229, 242, 249A, 249B, 276, 379Y, 379Z, 448; COMM 272; ENGR 231; LINGUIST 180; MS&E 288; ME 206A, 206B, 313, 314, 377; PSYCH 221
6. Numerical Analysis/Scientific Computation
   a. CME 302, 306; CS 205A
   b. at least two of: CME 326; CS 205B; MS&E 121; MATH 131, 132, 220A; STATS 200
   c. at least two of: CS 223A, 327A, 339; AA 214A, 214B; CME 324, 342
7. Real-World Computing
   a. at least two of: CS 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. a total of 21 units from the above and from the following: CS 225A, 225B, 228, 229, 247, 270, 271, 272, 273A, 274, 294A, 327A, 328, 448; CME 324
8. Software Theory
   a. CS 242, 243, 256, 258
   b. at least one of: CS 244, 245, 295, 343, 345
   c. at least one course from the following: CS 255, 259, 261, 268, 355, 356, 361A, 361B, 365
   d. at least one additional course chosen from (b), (c), and CS 346
9. Systems
   a. CS 240, 242
   b. at least three of: CS 243, 244, 245, 248, 348B; EE 271
   c. at least two additional courses chosen from (b) and the following: CS 194, 240C, 240D, 240E, 240X, 244B, 244C, 244E, 249A, 249B, 255, 259, 262, 270, 271, 272, 276, 294S, 295, 315A, 315B, 340, 343, 344, 344B, 344E, 345, 346, 347, 348A, 349, 374, 448; EE 384A, 384B, 384C, 384S, 384X, 384Y
10. Theoretical Computer Science
    a. CS 256, 258, 261 (361A, 361B, or 365 may be substituted for 261)
    b. at least four additional courses chosen from CS 228, 255, 259, 262, 268, 345, 355, 356, 357, 358, 359,* 361A, 361B, 364A, 364B, 365, 369,* 374; MS&E 310

* With consent of specialization chair.

Requirement 5—Additional elective units must be technical courses (numbered 100 or above) related to the degree program and approved by the adviser. 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./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./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. Note that the writing and research units described in parts (1) and (2) must be taken in addition to the 21 units required for the specialization, although they do count toward the 45 units required for the degree.
3. *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. Two copies 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 advisors 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. 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. and the M.S. degrees as specified in the Stanford Bulletin or elsewhere.

The Law School shall approve courses from the Computer Science Department that may count toward the J.D. degree, and the Computer Science Department shall approve 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 30 semester (45 quarter) hours of approved courses may be counted toward both degrees. No more than 24 semester (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 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) 8 semester (12 quarter) hours; or (ii) the maximum number of hours 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 will normally be 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 9, 2008. See http://cs.stanford.edu/wiki/admissions for complete information. Changes or updates to the admission process are posted in September and October, 2008. 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. 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 who fulfills six of thirteen exams in the breadth requirement may apply for candidacy prior to the second year in the program. The student must completely satisfy the breadth requirement by the end of nine quarters (excluding Summer Quarters), and must pass a qualifying exam in the general area of the expected dissertation.
3. As part of the training for the Ph.D., the student is 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.
4. 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. In some cases, the dissertation adviser may be in another department.
5. The student must pass a University oral examination in the form of a defense of the dissertation. This is typically held after all or a substantial portion of the dissertation research has been completed.
6. The student is expected to demonstrate the ability to present scholarly material orally, both in the dissertation defense and by a lecture in a department seminar.
7. 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 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 '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.

ELECTRICAL ENGINEERING

Emeriti: (Professors) Clayton W. Bates, Richard Bube, Von R. Eshleman, Michael J. Flynn,* Gene F. Franklin,* Joseph W. Goodman, Robert A. Helliwell,* 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, Anthony E. Siegman, Leonard Tyler,* Robert L. White; (*Associate Professor*) Bruce B. Lusignan; *(Professors, Research)* Donald L. Carpenter,* Aldo da Rosa,* Antony Fraser-Smith,* C. Robert Helms, Ingolf Lindau,* David Luckham, Calvin F. Quate

Chair: Mark Horowitz

Vice Chair: Simon Wong

Associate Chair (Admissions): R. Fabian Pease

Assistant Chair: Sharon A. Gerlach

Professors: Nicholas Bambos, Stephen P. Boyd, John M. Cioffi, 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, Stephen E. 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, Teresa H. Y. Meng, David A. B. Miller, Dwight G. Nishimura, Oyekunle Olukotun, Brad G. Osgood, R. Fabian W. Pease, James D. Plummer, Krishna Saraswat, Fouad A. Tobagi, Shan X. Wang, Jennifer Widom, Bernard Widrow, 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, Nick McKeown, John Pauly, Balaji Prabhakar, Mendel Rosenblum, Krishna V. Shenoy, Olav Solgaard, Sebastian Thrun, Benjamin Van Roy, Jelena Vuckovic

Assistant Professors: Christoforos E. Kozyrakis, Philip Levis, Subhasish Mitra, Andrea Montanari, Boris Murmann, Peter Peumans, Tsachy Weissman

Professors (Research): James F. Gibbons, Leonid Kazovsky, Butrus Khuri-Yakub, Yoshio Nishi, Arogyaswami J. Paulraj, Piero Pianetta

Acting Assistant Professor: Laurent Giovangrandi

Courtesy Professors: Stacey Bent, John Bravman, 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, Brian Wandell, Yinyu Ye, Shoucheng Zhang

Courtesy Associate Professors: Kwabena Boahen, Michael McConnell, Daniel Spielman, Claire Tomlin

Courtesy Assistant Professors: Ramesh Johari, Sanjay Lall, Hari Manoharan, David Mazieres, Andrew Ng, Gunter Niemeyer, Amin Saberi

Lecturers: Dennis Allison, Michel Digonnet, Andrew Freeman, Dieter Scherer, Jason Stinson, Howard Swain, Meenaradchagan Vishnu, James Weaver

Consulting Professors: David Adler, Ahmad Bahai,* Ezio Biglieri, Marina Bosi-Goldberg, Richard Dasher, John Doolittle, Timothy Drabnik, Abbas Emami-Naeini,* Alfred Gharakhanian, Fred M. Gibbons, Michael Godfrey, Homayoun Hashemi, Richard Hester, Bertrand Hochwald, Bob S. Hu, Theodore Kamins, Rajeev Krishnamoorhy, David Leeson, Roger Melen, Martin Morf, Mehrdad Moslehi, Madihally Narasimha, Yi-Ching Pao, Gurudatta Parulkar, Marcellinus Pelgrom, Stephen Richardson, Ronald Schafer, James Spilker, Jr., Donald Stark, Martin Walt, John Wenstrand, Jeffrey Wilde

Consulting Associate Professors: Hamid Aghajan, John Apostolopoulos, David Burns, Edward Chan, Ludwig Galambos, Maria del Mar Hershenson, My. T. Le, John Lockwood, Sergei Orlov, Glenn Solomon, Noel Thompson, Jun Ye, Bin Yu

Consulting Assistant Professors: Guido Appenzeller, Divanilson Campelo, Robert Candler, Ronald Ho, Patrick Hung, Kapur Pawan, Tejas Krishnamohan, Ravi Narasimhan, Micah Siegel, Olaf Tornblad, Katelijn Vleugels

Visiting Professors: Yeheskel Bar-Ness, Tetsushi Ikegami, Tiejun Lu, Dipankar Raychaudhuri, Shigeru Shimamoto, Zhiping Yu

Visiting Associate Professors: Shueng-Han Chan, Po-Tsun Liu, Eduardo Martos Naya, Hsiao-Chun Wu, Jun-Bo Yoon

Visiting Assistant Professors: John Jameson, Ofer Levi, Daniel Pickard, Maneesh Sahani

* recalled to active duty

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

Courses offered by the Department of Electrical Engineering have the subject code EE, and are listed in the "Electrical Engineering (EE) Courses" section of this bulletin.

UNDERGRADUATE PROGRAMS 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 and impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology.

Graduates of the undergraduate program are expected to possess knowledge of the fundamentals of electrical engineering and at least one specialty area. The graduates are expected to have the basic experimental, design, and communication skills to be prepared for continued study at the graduate level or for entry-level positions that require a basic knowledge of electrical engineering, science, and technology.

The educational objectives of the program are:

1. Technical knowledge: provide a basic 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.

To major in Electrical Engineering (EE), undergraduates should follow the depth sequence given in the discussion of undergraduate programs in the "School of 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.

For information about an EE minor, see the "School of Engineering" section of this bulletin.

A Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. See "Dual and Coterminal Degree Programs" in the "School of Engineering"section of this bulletin.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 with graduate standing in Electrical Engineering (EE) should be completed electronically at http://gradadmissions.stanford.edu. For more information concerning Electrical Engineering graduate admissions, see http://ee-admissions.stanford.edu. The application deadline for admission for Autumn Quarter 2009-10 is December 16, 2008.

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 quarter 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.
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, including:
   a. at least 36 letter-graded units
   b. at least 36 units at or above the 100 level
   c. at least 30 units in technical areas such as engineering, mathematics, and science; 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.

ENGINEER 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. A student would need 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.

The best procedure for the applicant to follow is (1) if now working toward the Stanford M.S. degree in Electrical Engineering, 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, or (2) if not planning to receive the Stanford M.S. degree in Electrical Engineering, 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 program of study is prepared by the student with the help of the thesis adviser and submitted 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/engineer.html.

DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING

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 Ph.D. 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.

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.

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.

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 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 areas listed below.

COMMUNICATIONS

Adaptive Modulation and Coding
Adaptive Multiuser Coding and Reception
Applied Optics and Optoelectronics
Cellular Radio Systems/Networks
Coding and Coded Modulation
Communication Channels and Signal Propagation
Communication and Information Theory
Digital Subscriber Lines
Digital Transmission
Frequency Reuse in Large Wireless Networks
Mobility in Wireless Networks
Multicarrier Modulation and OFDM
Multipath Mitigation Techniques
Multiple Access Techniques
Multiple Antenna and MIMO Systems
Optical Communications
Optical Networks
Optoelectronic Components and Systems
Resource Allocation/Channel Assignment/Handoff in Wireless Networks
Wavelength Division Multiplexing
Wireless Ad-Hoc Networks
Wireless Communications
Wireless Local Area Networks
Wireless Personal Communication Systems

COMPUTER SYSTEMS

Asynchronous Circuits
Compilers
Computer-Aided Design
Computer Architecture
Computer Graphics
Computer Networks
Computer Organization
Computer Reliability
Concurrent Languages
Concurrent Processes and Processors
Database and Information Systems
Distributed Systems
Embedded System Design
Hardware/Software Co-Design
Hardware Verification
Human Computer Interaction
Multimedia Systems
Operating Systems
Performance Measurement and Modeling
Programming Languages
Program Verification
Robust Systems
VLSI Design

INFORMATION SYSTEMS

Adaptive Control and Signal Processing
Adaptive Neural Networks
Biomedical Signal Analysis
Computer-Aided Design and Analysis of Systems
Data Communications
Digital Signal Processing
Estimation Theory and Applications
Fourier and Statistical Optics
Information and Coding Theory
Medical Imaging and Image Processing
Multivariable Control
Optical Communications
Optimization-Based Design
Pattern Recognition and Complexity
Quantization and Data Compression
Real-Time Computer Applications
Signal Processing
Speech and Image Coding

INTEGRATED CIRCUITS

Analog Integrated Circuits
Biomedical Sensors, Circuits, and Signal Processing
Bipolar, MOS, and other Device and Circuit Technologies
CAD of Processes, Devices, and Equipment
Custom Integrated Circuits for Computers and Telecommunications
Digital Integrated Circuits
Integrated Sensors and Actuators
Mixed Signal Integrated Circuits
Nanostructures
Neural Recording and Signal Processing
Optoelectronic Integrated Circuits
Organic Materials, Devices and Circuits
Process, Device, Circuit, and Equipment Modeling
RF Circuits for Wireless Transmission
Robust Circuits
Sensors and Control for VLSI Manufacturing
VLSI Device Structures and Physics
VLSI Fabrication Technology
VLSI Materials, Interconnections, and Contacts
VLSI Packaging and Testing

LASERS AND QUANTUM ELECTRONICS

Coherent UV and X-Ray Sources
Free-Electron Lasers
Laser Applications in Aeronautics, Biology, Chemistry, Communications, Electronics, and Physics
Laser Devices and Laser Physics
Nonlinear Optical Devices and Materials
Optoelectronic Devices
Photoacoustic Phenomena
Semiconductor Diode Lasers
Ultrafast Optics and Electronics

MICROWAVES, ACOUSTICS, AND OPTICS

Acoustic Microscopy
Acousto-Optic Devices
Fiber Optics
Holography
Microwave Integrated Circuits and Devices
Nanophotonics
Nondestructive Testing
Optical Interferometry
Scanning Optical Microscopes

RADIOSCIENCE AND REMOTE SENSING

Environmental Studies using Satellite Technology
Exploration of the Earth from Space
Interferometric and Holographic Imaging with Radio Waves
Numerical Methods for Science Data Analysis
Optical Remote Sensing
Planetary Exploration
Radar Interferometry
Radar Remote Sensing
Radio Occultation Studies
Radio Wave Scattering
Remote Sensing of Atmospheres and Surfaces
Signal and Image Processing Methods
Space Data Management
Spaceborne Radio Receiver Development
Synthetic Aperture Radar Satellites

SOLID STATE

Applied and Fundamental Superconductivity
Crystal Preparation: Epitaxy and Ion Implantation, and Molecular Beam Epitaxy
Defect Analysis in Semiconductors
Electron and Ion Beam Optics
Electron Spectroscopy
Experimental Determination of the Electronic Structure of Solids
High Resolution Lithography
Laser, Electron, and Ion Beam Processing and Analysis
Magnetic Information Storage
Magnetic Materials Fundamentals and Nanostructures
Nanostructure Fabrication and Applications
Nanophotonics
Molecular Beam Epitaxy
Novel Packaging Approaches for Electronic Systems
Optoelectronic Devices
Physics and Chemistry of Surfaces and Interfaces

Semiconductor and Solid State Physics
Solid State Devices: Physics and Fabrication
Ultrasmall Electron and Photodevices

SPACE PHYSICS AND ELECTROMAGNETICS

Computational Electromagnetics
Detection of Electromagnetic Fields from Earthquakes
Electromagnetic Waves and Plasmas
Geomagnetically Trapped Radiation
Ionospheric and Magnetospheric Physics
Ionospheric Modification
Lightning Discharges
Lightning-Ionosphere Interactions
Space Engineering (also see the "Space Science and Astrophysics" section of this bulletin)
Ultra-Low Frequency Fluctuations of the Earth's Magnetic Field
Very Low Frequency Wave Propagation and Scattering

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, Robert V. Oakford, Henry E. Riggs, David A. Thompson
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, William J. Perry, Robert I. Sutton, James L. Sweeney, Arthur F. Veinott, Jr., Yinyu Ye
Associate Professors: Samuel S. Chiu, Ashish Goel, Pamela J. Hinds, Ross D. Shachter, Edison T. S. Tse, Benjamin Van Roy
Assistant Professors: Diane E. Bailey, Feryal Erhun, Kay Giesecke, Ramesh Johari, Riitta Katila, 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, Walter Powell
Lecturers: Steve Blank, Hill Huntington, Ferdo Ivanek, Phil Lin, Mary Morrison, Donna Novitsky, Darius Rafinejad, Lena Ramfelt, Tina Seelig, Rosanne Siino, Lynda Kate Smith
Consulting Professors: Gerd Infanger, Thomas Kosnik, James E. Matheson, D. Warner North, Burke Robinson, Sam L. Savage, Behnam Tabrizi
Consulting Associate Professors: Peter Haas, Samuel Holtzman, Michael Lyons, Audrey MacLean, Adam Seiver, F. Victor Stanton
Consulting Assistant Professors: Blake E. Johnson, Hervé Kieffel, Jan Pietzsch
Visiting Professor: Olivier de La Grandville
Visiting Associate Professors: Charles Feinstein, Yee-Tien Fu
Visiting Assistant Professor: Peter Woehrmann
Director of the Industrial Affiliates Program: Yinyu Ye

Department Offices: Terman Engineering Center, 380 Panama Mall
Mail Code: 94305-4026
Web Site: http://www.stanford.edu/dept/MSandE

Courses offered by the Department of Management Science and Engineering have the subject code MS&E, and are listed in the "Management Science and Engineering (MS&E) Courses" section of this bulletin.

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; and (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.

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.

UNDERGRADUATE PROGRAM IN MANAGEMENT SCIENCE AND ENGINEERING

BACHELOR OF SCIENCE IN MANAGEMENT SCIENCE AND ENGINEERING

The program leading to the B.S. degree in Management Science and Engineering (MS&E) is stated earlier under the "School of Engineering" section of this bulletin, and 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 sophomore 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 goals of the undergraduate degree program are:

1. *Principles and Skills:* provide students with a basic understanding of management science and engineering principles, including analytical problem solving and communications skills.

2. *Preparation for Practice:* prepare students for practice in a field that sees rapid changes in tools, problems, and opportunities.
3. *Preparation for Continued Growth:* prepare students for graduate study and self development over an entire career, and
4. *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:

1. an ability to apply knowledge of math, science, and engineering.
2. an ability to design and conduct experiments.
3. an ability to design a system or components to meet desired needs.
4. an ability to identify, formulate, and solve engineering problems.
5. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
6. an ability to function on multidisciplinary teams.
7. an ability to communicate effectively.
8. a recognition of the need for and an ability to engage in life-long learning.
9. background necessary for admission to top professional graduate engineering or business programs.
10. an understanding of professional and ethical responsibility.
11. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
12. 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.

For information about an MS&E minor, see the "School of Engineering" 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.

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 9 and the deadline for application to the master's program is January 6.

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.

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.

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 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 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—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 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 30 semester (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 36 semester (54 quarter) hours of approved courses may be counted toward both degrees. In either case, no more than 24 semester (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 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) 12 semester (18 quarter) hours 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:

- 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 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 which is 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 ten MS&E M.S. 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, Jr., 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, John C. Bravman, Bruce M. Clemens, Reinhold H. Dauskardt, Friedrich B. Prinz, Robert Sinclair, Shan X. Wang

Associate Professors: Mark L. Brongersma, Michael D. McGehee, Paul C. McIntyre

Assistant Professors: Yi Cui, Sarah C. Heilshorn, Aaron M. Lindenberg, Nicholas A. Melosh, Alberto Salleo

Courtesy Professors: Stacey F. Bent, Curtis W. Frank, James S. Harris, Yoshio Nishi, James D. Plummer, Krishna Saraswat, Jonathan F. Stebbins, Joachim Stohr

Courtesy Associate Professor: Ian R. Fisher

Courtesy Assistant Professor: Harindran Manoharan

Lecturers: Ann Marshall, Arturas Vailionis

Acting Assistant Professor: Seung Min Han

Consulting Professors: Charles A. Evans, Robert E. Fontana, Turgut Gur, Michael A. Kelly, Alan Sellinger, Baylor Triplett, Robert M. White, Wendelin J. Wright

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Courses offered by the Department of Materials Science and Engineering have the subject code MATSCI, and are listed in the "Materials Science and Engineering (MATSCI) Courses" section of this bulletin.

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 nano-scale. The undergraduate program, described under the "School of Engineering" section of this bulletin, provides training for the materials engineer and also preparatory training for graduate work in materials science. Capable students are encouraged to take at least one year of graduate study to extend their course work to obtain a coterminal degree. Coterminal degree programs are encouraged both for undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines. Graduate programs lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy.

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 two microcomputer clusters for its students, both of which are 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 Center for Integrated Systems (CIS), the Geballe Laboratory for Advanced Materials (GLAM), and the Stanford Synchrotron Radiation Laboratory (SSRL).

The Center for Integrated Systems (CIS) 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, CIS provides startup research funds and maintains a Fellow-Mentor program with industry.

For information on GLAM and SSRL, see the "Geballe Laboratory for Advanced Materials" and "Stanford Synchrotron Radiation Laboratory" sections of this bulletin.

UNDERGRADUATE PROGRAMS IN MATERIALS SCIENCE AND ENGINEERING

BACHELOR OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING

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 "School of 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.

For information about the minor, see the "School of Engineering" section of this bulletin.

COTERMINAL B.S./M.S. PROGRAM IN MATERIALS SCIENCE ENGINEERING

Stanford undergraduates who wish to continue their studies for the Master of Science degree in 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 the quarter prior to the quarter of the expected completion of their undergraduate degree. 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 forms pertaining to the coterminal program may be obtained from the department's student services office in Durand 115.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN MATERIALS SCIENCE ENGINEERING

Graduate students can specialize in any of the areas of materials science and engineering.

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 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. Three core courses: 203; 204; 207.
3. Lab courses: MATSCI 171, 172, 173. *Note:* students who have had equivalent lab courses at other universities, equivalent practical experience, a materials related degree or background, or passed the Ph.D. qualifying exam, are expected to file a petition with the department's student services manager to have this requirement waived and to substitute other appropriate technical courses for the lab units.
4. 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 six 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.
d. a maximum of three units may be undergraduate units (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.

5. 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. 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 to the department's student services manager one week before final examinations of the final quarter of the program. The report is not an official University thesis but rather 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.

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 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 fully qualified M.S. students are 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 no pass 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 second 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.

** To be offered 2009-10

ADVANCED SPECIALTY COURSES

Biomaterials: APPPHYS 292; BIOPHYS 228; CHEMENG 260, 310, 355; ME 284A,B, 381, 385, 457; MATSCI 380, 381
Electronic Materials Processing: EE 212, 216, 311, 316, 410; MATSCI 312
Materials Characterization: APPPHYS 216, 218; CHEMENG 345; EE 329; MATSCI 320, 321, 322, 323, 325, 326
Mechanical Behavior of Solids: AA 252, 256; MATSCI 251, 270, 352, 353, 358; ME 335A,B,C, 340, 340A,B, 345
Physics of Solids and Computation: APPPHYS 218, 272, 273; EE 222, 223, 228, 327, 328, 329, 335; MATSCI 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 218. X-Ray and Neutron Scattering in the 21st Century
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. Microscale Transport in Chemical Engineering
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 50M. Introduction to Materials Science, Biomaterials Emphasis
ME 284A/B. Cardiovascular Bioengineering
ME 329. Physical Solid Mechanics
ME 335A/B. Finite Element Analysis
ME 335C. Introduction to Boundary 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, Robert McKim, Robert J. Moffat,* M. Godfrey Mungal, J. David Powell, Rudolph Sher, Charles R. Steele,* Milton D. Van Dyke, Douglass J. Wilde*; (*Professors, Research*) Elliot Levinthal, Richard M. Christensen, Sidney Self, Felix Zajac
Mechanical Engineering Executive Committee: Mark Cappelli (Student Services and Undergraduate Curriculum), Mark R. Cutkosky, John K. Eaton (Vice Chairman), Kenneth E. Goodson, (Graduate Admissions), Christian Gerdes (Graduate Curriculum), Drew Nelson (Student Services and Undergraduate Curriculum), Friedrich B. Prinz (Chairman, Mechanical Engineering)
Group Chairs: Thomas P. Andriacchi (Biomechanical Engineering), Craig T. Bowman (Thermosciences), Mark R. Cutkosky (Design), Parviz Moin (Flow Physics and Computation Engineering), Peter M. Pinsky (Mechanics and Computation)
Laboratory Directors: David W. Beach (Product Realization Laboratory), J. Edward Carryer (Smart Product Design Laboratory), Mark R. Cutkosky (Manufacturing Sciences Lab), John K. Eaton (Heat Transfer and Turbulence Mechanics), Charbel Farhat (Army High Performance Computing Research Center, AHPCRC), Kosuke Ishii (Manufacturing Modeling Laboratory), Thomas P. Andriacchi (Veterans Affairs Rehabilitation R&D Center), Larry J. Leifer (Center for Design Research), Reginald E. Mitchell (High Temperature Gas Dynamics), Parviz Moin (Center for Turbulence Research), Friedrich B. Prinz (Rapid Prototyping Laboratory)
Professors: Thomas P. Andriacchi, David M. Barnett, Craig T. Bowman, Brian J. Cantwell, Mark A. Cappelli, Dennis R. Carter, Mark R. Cutkosky, Scott Delp, John K. Eaton, Charbel Farhat, Kenneth E. Goodson, Ronald K. Hanson, Kosuke Ishii, David M. Kelley, Thomas W. Kenny, Charles H. Kruger, Larry J. Leifer, Sanjiva Lele, Parviz Moin, Drew V. Nelson, Peter M. Pinsky, Friedrich B. Prinz, Bernard Roth, Eric Shaqfeh, Sheri D. Sheppard
Associate Professors: Martin Z. Bazant, Christopher Edwards, J. Christian Gerdes, Marc Levenston, Reginald E. Mitchell, Heinz Pitsch, Juan G. Santiago
Assistant Professors: Wei Cai, Eric Darve, Gianluca Iaccarino, Ellen Kuhl, Adrian Lew, Gunter Niemeyer, Beth Pruitt, Xiaolin Zheng
Professor (Research): Kenneth Waldron
Professor (Teaching): David W. Beach

Courtesy Professors: Fu-Kuo Chang, Ralph Greco, Kenneth Salisbury, George S. Springer, Robert T. Street, Charles Taylor, Paul Yock
Senior Lecturers: Vadim Khayms, J. Craig Milroy
Lecturer: Matthew R. Ohline
Consulting Professors: Gary S. Beaupre, David M. Golden, Barry M. Katz, Stephen Walch, Edith Wilson
Consulting Associate Professors: J. Edward Carryer, Gary D. Lichtenstein, Paul Mitiguy, William Moggridge, Carol B. Muller, Sunil Puria, Paul Saffo, George Toye, Machiel Van der Loos
Consulting Assistant Professors: Michael Barry, Mark Bolas, Brendan J. Boyle, Dennis Boyle, William Burnett, Dev Patnaik, Sara Little Turnbull

* 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 have the subject code ME, and are listed in the "Mechanical Engineering (ME) Courses" section of this bulletin.

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.

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, micro-electromechanics 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, environment 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.

Mission Statement—The goal of Stanford's undergraduate program in Mechanical Engineering is to provide each student with a balance of intellectual and practical experiences, accumulation of knowledge, and self-discovery to prepare the graduate to address societal needs. The program prepares each student for entry-level work as a mechanical engineer, graduate study in engineering, or graduate study in another field where a broad engineering background provides a foundation. With grounding in the principles and practice of mechanical engineering, graduates are ready to engage in learning about and employing new concepts, technologies, and methodologies.

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 with 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 super-minicomputers. 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.

UNDERGRADUATE PROGRAMS IN MECHANICAL ENGINEERING

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Undergraduates seeking to major in Mechanical Engineering should see the curriculum outlined in the "School of 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 (math; 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). An individually designed 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).

For information about an ME minor, see the "School of 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 department honors, students admitted to the program must:

1. maintain the 3.5 GPA required for admission to the honors program.
2. under the direction of the thesis adviser, complete at least 9 units of ME 191H, Honors Thesis, during the senior year.
3. submit a completed thesis draft to the adviser by mid-May. Further revisions and final endorsement by the adviser are to be finished by the first week of June, when two bound copies are to be submitted to the Mechanical Engineering student services office.
4. 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

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 (February 3 is the deadline) prior to Spring Quarter graduation. The application must provide evidence of potential for strong academic performance as a graduate student. The M.E. 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 80, 112, 113, 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.

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.

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.

Requirements are subject to change and students are encouraged to refer to the most recent *Mechanical Engineering Graduate Student Handbook* provided by the student services office and located at me.stanford.edu. The department's requirements for the M.S. in Mechanical Engineering are as follows:

1. *Mathematical Fundamentals:* two math 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 205; EE 261, 263; STATS 110, 141; ENGR 155C. Other MATH and CME courses with catalog numbers of 200 and above also fulfill the math 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 math, 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, math, 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, and 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

AA 244A. Free and Forced Motion of Structures
ANTHRO 332. Transformative Design
CHEMENG 444. Quantum Simulations of Molecules and Materials
CME 210. Multiscale Methods in Engineering
CS 223A. Introduction to Robotics
CS 327A. Advanced Robotics
ENGR 207A. Linear Control Systems I
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

PRODUCT DESIGN IN MECHANICAL ENGINEERING

The Joint Program in Design focuses on the synthesis of technology with human needs and values to create innovative product experiences. This program is a joint offering of the departments of Mechanical Engineering and Art and Art History. It provides a design education that integrates technical, human, aesthetic, and business concerns. The resulting two-year degree of M.S. in Engineering (Product Design subplan) is considered a terminal degree for the practice of design.

Subject and Catalog Number	*Units*
ARTSTUDI 60. Design I: Fundamental Visual Language	3
ARTSTUDI 160. Design II: The Bridge	3
ME203. Manufacturing and Design	4
ME216A. Advanced Product Design: Needfinding	4
ME216B. Advanced Product Design: Implementation	4
ME312. Advanced Product Design: Formgiving	4
ME313. Human Value and Innovation in Design*	3
ME316A,B,C. Product Design Master's Project†	12
ME365 Structure of Design Research*	1-3
ARTSTUDI 360A,B,C. Master's Project†	6
Approved Electives**	14-16
Total Units	60

* Must be taken for a letter grade only

† ME 316A,B,C and ARTSTUDI 360A,B,C are taken concurrently for three quarters during the second year.

** Approved electives fulfill career objectives of the students. Students may focus their energy in engineering, business, psychology, or other areas relevant to design. Most students elect a broad approach that spans these domains and increases their cultural awareness. Approved electives must be discussed with the student's adviser.

Admission requirements are the same as for the M.S. in Mechanical Engineering described above, with additional requirements of a minimum of one year's experience after the bachelor's degree, and a portfolio showing strong evidence of design ability and aesthetic skills and sensitivity.

Students with non-engineering undergraduate degrees in design, art, architecture, or similar majors, may apply to the Department of Art and Art History for a similar graduate design program leading to an M.F.A. in Design. Students with non-engineering degrees who wish to earn the M.S. degree should consult with the program adviser.

BIOMECHANICAL ENGINEERING IN MECHANICAL ENGINEERING

Students interested in graduate studies in biomechanical engineering can choose one of the programs below.

1. *M.S. in Mechanical Engineering:* students who apply and are admitted to the M.S. in Mechanical Engineering program can elect to take biomechanical engineering courses as part of their requirements. These courses may be applied towards the student's engineering breadth or technical electives.
2. *M.S. in Engineering, Biomechanical Engineering subplan*: this program allows students more flexibility in taking courses in the life sciences and generally emphasizes a more interdisciplinary curriculum. Minimum grade point average (GPA) requirements are the same as for the M.S. in Mechanical Engineering. Details

of this program can be found in the *Mechanical Engineering Graduate Student Handbook*.

A Ph.D. in Biomechanical Engineering is not offered. Students from either master's degree path (Mechanical Engineering or Engineering, Biomechanical Engineering subplan) receive their Ph.D. degrees in Mechanical Engineering.

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.

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 Degrees" 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 math and the engineering sciences, together with intensive study and research experience in a specialized area, are the necessary requisites.

The department allows but does not require a minor field from another department. However, if a minor is waived, the candidate must show breadth of training by taking courses in one or more related fields or departments as noted below.

Ph.D. students must have a master's degree, and must fulfill the requirements for the Stanford M.S. degree in Mechanical Engineering.

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 or at http://me.stanford.edu/current/grad1/phd_qual.html.

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 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. Questions should be directed to the department student services manager.

The department has a breadth requirement for the Ph.D. degree. This may be satisfied either by a formal minor in another department or by at least 9 units of course work that is approved by the principal dissertation adviser.

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

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.

SCHOOL OF HUMANITIES AND SCIENCES

Dean: Richard P. Saller
Senior Associate Deans: Martin Fejer, Ian Gotlib, Stephen Hinton, Susan Stephens
Senior Associate Dean for Finance and Administration: Adam R. Daniel
Associate Dean for Faculty Affairs: Tina Kass
Associate Dean for Graduate and Undergraduate Studies: Lorraine Sterritt
Assistant Deans for Graduate and Undergraduate Studies and Diversity Programs: Joseph Brown, Ayodele Thomas
Department Chairs: Theodore Andersson (German Studies), Russell Berman (Comparative Literature), Lawrence Goulder (Economics), Patricia Burchat (Physics), Chao Fen Sun (Asian Languages), Karen Cook (Sociology), James Fearon (Political Science), James Ferguson (Anthropology), James Fishkin (Communication), Gregory Freidin (Slavic Languages and Literatures), Hester Gelber (Religious Studies), Roland Greene (Division of Languages, Cultures, and Literatures), Robert Harrison (French and Italian), Trevor Hastie (Statistics), Aharon Kapitulnik (Applied Physics), Walter Scheidel (Classics), Rafe Mazzeo (Mathematics), Peggy Phelan (Drama), Joan Ramon Resina (Spanish and Portuguese), Paula Findlen (History), Jennifer Summit (English), Kristine Samuelson (Art and Art History), Stephen Sano (Music), Robert Simoni (Biology), Stephen Palumbi (Hopkins Marine Station), Helen Longino (Philosophy), Brian Wandell (Psychology), Tom Wasow (Linguistics), 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, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and so are 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 crosscultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they become better-informed participants and leaders in today's increasingly technological societies.

The research environment within the school offers undergraduates 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, Asian Languages, Biology (and the Hopkins Marine Station), Chemistry, Classics, Communication, Comparative Literature, Drama, Economics, English, French and Italian, German Studies, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Religious Studies, Slavic Languages and Literatures, Sociology, Spanish and Portuguese, and Statistics.

The school also includes 19 interdepartmental degree programs: African and African American Studies; African Studies; American Studies; Archaeology; Biophysics; Comparative Studies in Race and Ethnicity; East Asian Studies; Human Biology; Feminist Studies; Financial Mathematics; 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 and Sciences are listed under the 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: Michele Elam
Associate Director: Cheryl Richardson
Advisory Committee: Clayborne Carson (History), Linda Darling-Hammond (Education), Harry Elam (Drama), Joel Samoff (African Studies), Morris Graves (Associate Dean of Students), Elaine C. Ray (Director, Stanford University News Service), Arnold Rampersad (English), John R. Rickford (Linguistics), Dorothy Steele (CCSRE)
Affiliated Faculty: David Abernethy (Political Science, emeritus), R. Lanier Anderson (Philosophy), Arnetha Ball (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 History), Linda Darling-Hammond (Education), David Degusta (Anthropology), Sally Dickson (Law), Sandra Drake (English, emeritus), Jennifer Eberhardt (Psychology), Paulla Ebron (Anthropology), Harry Elam (Drama), 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), Liisa Malkki (Anthropology), Hazel Markus (Psychology), Barbaro Martinez-Ruiz (Art and Art History), Monica McDermott (Sociology), Tania Mitchell (CCSRE), Robert Moses (Drama), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Comparative Literature), Na'ilah S. Nasir (Education), Susan Olzak (Sociology), David Palumbo-Liu (Comparative Literature), Patricia Powell (African and African American Studies), Jack Rakove (History), Arnold

Rampersad (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
Mail Code: 94305-2084
Phone: (650) 723-3782
Email: aaas@stanford.edu
Web Site: http://www.stanford.edu/dept/AAAS

Courses offered by the Program in African and African American Studies have the subject code AFRICAAM, and are listed in the "African and African American Studies (AFRICAAM) Courses" section of this bulletin.

UNDERGRADUATE PROGRAMS 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 provides research training and community service learning opportunities for undergraduates. It has developed an extensive and dedicated 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 anthropology, art, art history, economics, languages, linguistics, literature, music, philosophy, political science, psychology, religion, and sociology, among others. The Program emphasizes rigorous and creative scholarship and research, and fosters close academic advising with a faculty advisor, the AAAS Associate Director, and the Director.

Note: There are four majors offered as part of CCSRE: Asian American Studies, Chicana/o Studies, Native American Studies, and Comparative Studies. There are two other Majors that are affiliated with CCSRE: African and African American Studies and Jewish Studies.

BACHELOR OF ARTS IN AFRICAN AND AFRICAN AMERICAN STUDIES

MAJOR

Majors must complete a total of 60 units, of which 25 units are selected from the AAAS core courses. This includes at least:

1. one course on Africa, to be approved by the AAAS director and associate director
2. two AAAS core courses chosen from:
   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 and American Culture *or* ENGLISH 172G. Great Works of the African American Literary Tradition
3. two Comparative Studies in Race and Ethnicity (CSRE) core courses:
   CSRE 196C. Introduction to Comparative Studies in Race
   CSRE 200X. CSRE Senior Seminar (WIM)
4. a CSRE senior thesis

Students also work closely with a faculty adviser, the AAAS associate drector, and the AAAS director in developing a coherent emphasis within their major that reflects their scholarly interests in the field. Students can choose from the following emphases: Africa; African American; Diaspora; Identities, Diversity, and Aesthetics (IDA); Gender; Class; Theory; Historical Period. Other emphases must be approved by the AAAS director and associate director.

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 coursework taken across various departments and programs into a coherent focus. Emphases offered include:

Africa; African American; 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 advisor within the first year of declaring the major.

HONORS PROGRAM

Majors who have maintained a grade point average (GPA) of at least 3.5 in the major may apply for the honors program. Students should apply in the Spring Quarter of junior 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 thesis must be discussed with and approved by the major adviser and the program director. A student may receive 5-15 units for the honors thesis. Students completing an honors thesis must participate in at least two quarters of the CSRE Senior Seminar; take CSRE 200X in Autumn Quarter; and take AFRICAAM 199 in Winter and Spring quarters for the full 15 units.

CORE COURSES

The core consists of 25 units, including the above requirements.

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. Great Works of the African American Tradition	5
or ENGLISH 172G. Great Works of the African American Tradition	5
COMM 148. Hip-Hop and Don't Stop: Introduction to Modern Speech Communities	4-5
ENGLISH 152D. W.E.B. Du Bois and American Culture (required) (not given this year)	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

CSRE CORE COURSES

The following courses are required for AAAS majors:

CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 200X. CSRE Senior Seminar (WIM)	5

AAAS COURSES

AFRICAAM 12. Presidential Politics: Race, Class, Faith & Gender in the 2008 Election
AFRICAAM 40. The Muse, Musings, and Music
AFRICAAM 101. African and African American Lecture Series: Race and Faith
AFRICAAM 105. Introduction to African and African American Studies
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

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
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. Indentity, 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
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 43/143. 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
FRENLIT 248. Literature, History, and Representation
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
IHUM 68A/68B. Performing Religion
LINGUIST 65. African American Vernacular English
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 161B. Jazz Orchestra
PHIL 177. Philosophical Issues Concerning Race and Racism
POLISCI 136. Philosophical Issues Concerning Race and Racism (not offered this year)
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
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.

AFRICAN STUDIES

Emeriti: David B. Abernethy, John Baugh, Sandra E. Drake, George M. Frederickson, James. L. Gibbs, Jr., William B. Gould, Bruce F. Johnston, William R. Leben, Hans N. Weiler, Sylvia Wynter
Chair: Richard Roberts
Professors: Jean-Marie Apostolidès (French, Drama), Ellen Jo Baron (Pathology), Joel Beinin (History), Russell Berman (Comparative Literature, German Studies), John Boothroyd (Microbiology and Immunology), Elisabeth Mudimbe-Boyi (French and Italian, Comparative Literature), Joan Bresnan (Linguistics), Martin Carnoy (Education), Peter Egbert (Ophthalmology, emeritus), 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), Mary L. Polan (Obstetrics and Gynecology), John Rickford (Linguistics), Richard Roberts (History)
Associate Professors: Paulla A. Ebron (Anthropology), Bruce Lusignan (Electrical Engineering, emeritus), Liisa Malkki (Anthropology)
Assistant Professors: David DeGusta (Anthropology), Oliver Fringer (Civil and Environmental Engineering), Sean A. Hanretta (History), Barbaro Martinez-Ruiz (Art History), Kathryn Miller (History), 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), Susan Cashion (Dance), Helen Stacy (Law)
Lecturers: Byron Bland (Stanford Center on Conflict and Negotiation), Jonathan Greenberg (Law), Sanghai Mohochi (African and Middle Eastern Languages), Timothy Stanton (Bing Overseas Studies), Byron Sibanda (African and Middle Eastern Languages)
Consulting Professor: Joel Samoff (Center for African Studies)
Curators: Peter Duignan (Senior Fellow, emeritus, Hoover Institution), 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
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Web Site: http://africanstudies.stanford.edu

Courses offered by the Center for African Studies have the subject code AFRICAST, and are listed in the "African Studies (AFRICAST) Courses" section of this bulletin.

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 Swahili and Arabic, 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, Xhosa, Yoruba, and Zulu.

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.

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.

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 a 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 6. 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 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.

The following courses may be used to fulfill optional course requirements:

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
CLASSHIS 105. History and Culture of Ancient Egypt
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

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 6. For more information or an application, contact the center.

AMERICAN STUDIES

Director: Shelley Fisher Fishkin (on leave Winter, Spring)
Program Coordinator: Richard Gillam (Acting Director, Winter, Spring)
Administrative Committee: Barton J. Bernstein (History), David Brady (Political Science), Scott Bukatman (Art and Art History), Gordon H. Chang (History), Michele B. Elam (English), Estelle Freedman (History), Nicholas Jenkins (English), Gavin Jones (English), Doug McAdam (Sociology), Hilton Obenzinger (English), David Palumbo-Liu (Comparative Literature), Jack Rakove (History), Arnold Rampersad (English), Rob Reich (Political Science), Judith Richardson (English, on leave), Ramón Saldívar (English, Comparative Literature, on leave), Stephen Sohn (English), Fred Turner (Communication), Barry Weingast (Political Science), Caroline Winterer (History, on leave), Bryan Wolf (Art and Art History), Gavin Wright (Economics)

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Courses offered by American Studies Program have the subject code AMSTUD, and are listed in the "American Studies (AMSTUD) Courses" section of this bulletin.

The American Studies Program is administered through the office of Interdisciplinary Studies in Humanities.

UNDERGRADUATE PROGRAMS IN AMERICAN STUDIES

BACHELOR OF ARTS IN AMERICAN STUDIES

American Studies is an interdisciplinary undergraduate major that seeks to convey 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 bring a range of disciplines to bear on their efforts to analyze and interpret America's past and present, forging fresh and creative syntheses along the way.

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, art, and culture. 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.

The course requirements for the American Studies major are:

1. *History and Institutions*—American Studies majors are required to complete three foundation courses in American History and Institutions. Specific requirements are:
   HISTORY 150A. Colonial and Revolutionary America
   HISTORY 150B. 19th-Century America
   The third course may be chosen from one of the following:
   - AMSTUD 179. Introduction to American Law
   - ECON 116. American Economic History
   - HISTORY 150C. The United States in the 20th Century
   - HISTORY 154. 19th-Century U.S. Cultural and Intellectual History 1790-1860 (not given 2008-09)
   - HISTORY 158. The United States since 1945 (not given 2008-09)
   - HISTORY 161. U.S. Women's History, 1890s-1990s (not given 2008-09)
   - HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
   - POLISCI 2. American National Government and Politics
2. *Literature, Art, and Culture*—Majors must take three gateway courses that, together, cover the broad range of the American experience. Specific requirements are:
   a. at least one course focusing on the period before the Civil War, normally AMSTUD 150, American Literature and Culture to 1855
   b. two additional courses, including at least one from Art or Drama. Choices include but are not limited to:
      - AMSTUD 138C. *Huckleberry Finn* and American Culture (not given 2008-09)
      - ARTHIST 132. American Art and Culture, 1528-1860 (not given 2008-09)
      - ARTHIST 133. American Art and Culture in the Gilded Age
      - ARTHIST 155. American Art Since 1945
      - ARTHIST 178. Ethnicity and Dissent in United States Art and Literature (not given 2008-09)
      - ARTHIST 234A. Harlem Renaissance
      - DRAMA 163. Performance and America (not given 2008-09)
      - DRAMA 219. Contemporary African American Drama: August Wilson, Suzan-Lori Parks, and Beyond
      - ENGLISH 121. Masterpieces of American Literature
      - ENGLISH 143. Introduction to African American Literature
      - ENGLISH 172E. Literature of the Americas
      - ENGLISH 186A. American Hauntings
3. *Comparative Race and Ethnicity*—Majors are required to take one course in Comparative Studies of Race and Ethnicity (CSRE) that focuses on comparative studies rather than a single racial or ethnic group (5 units). Courses that satisfy this requirement include:
   - AMSTUD 114N. Visions of the 1960s
   - AMSTUD 183. Border Crossings and American Identity
   - AMSTUD 214. The American 1960s: Thought, Protest, and Culture
   - CASA 88. Theories of Race and Ethnicity
   - COMPLIT 148. Introduction to Asian American Cultures
   - COMPLIT 241. Comparative Fictions of Ethnicity (not given 2008-09)
   - CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity
   - SOC 138/238. American Indians in Comparative Historical Perspective
   - SOC 148. Racial Identity
   - SOC 149. The Urban Underclass

   If a CSRE course is appropriate for a student's thematic focus, the course may be used to satisfy both this requirement and, in part, the unit requirement for the focus.
4. *Gateway Seminar*—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.

Thematic Concentration and Capstone Seminar—Students must design a thematic concentration of at least 5 courses. The courses, taken together, must give the student in-depth knowledge and understanding of a coherent topic in American cultures, history, and institutions. With the help of faculty advisers, students are required to design their own thematic concentrations, preferably by the end of registration period, Autumn Quarter of the junior year. Sample thematic concentrations and courses that allow a student to explore

them are available in the American Studies Office in Building 240.

Students may choose courses for their thematic concentration from the following list.

AFRICAAM 105. Introduction to African and African American Studies
AFRICAAM 152. W.E.B. DuBois as Writer and Philosopher
ANTHRO 82/282. Medical Anthropology
ANTHRO 179. Cultures of Disease: Cancer
ANTHRO 180. Science, Technology, and Gender
ARTHIST 160A. Twentieth Century African American Art
COMM 1A/211. Media Technologies, People, and Society
COMM 1B. Media, Culture, and Society
COMM 116. Journalism Law
COMM 117. Digital Journalism
COMM 120. Digital Media in Society
COMM 125. Perspectives on American Journalism
COMM 131. Media Ethics and Responsibilities
COMM 136. Democracy and the Communication of Consent
COMM 148. Hip-Hop and Don't Stop: Introduction to Modern Speech Communities
COMM 160. The Press and the Political Process
COMM 162. Analysis of Political Campaigns
COMM 244. Democracy, Press, and Public Opinion
COMPLIT 41Q. Ethnicity and Literature
COMPLIT 142. The Literature of the Americas
COMPLIT 148. Introduction to Asian American Cultures
DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts
DRAMA 180Q. Noam Chomsky: The Drama of Resistance
ECON 153. Economics of the Internet
ECON 155. Environmental Economics and Policy
ECON 157. Imperfect Competition
ECON 158. Antitrust and Regulation
EDUC 102. Examining Social Structures, Power, and Educational Access
EDUC 112X/212X. Urban Education
EDUC 115Q. Identities, Race, and Culture in Urban Schools
EDUC 165/265. History of Higher Education in the U. S.
EDUC 177/277. Education of Immigrant Students: Psychological Perspectives
EDUC 201A. History of African American Education
EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century
ENGLISH 42B/142B. The Films of Woody Allen
ENGLISH 42E/142E. The Films of the Coen Brothers
FEMST 101. Introduction to Feminist Studies
FEMST 188N. Imagining Women: Writers in Print and in Person
HISTORY 150C. The United States in the Twentieth Century
HISTORY 154A. Religion and American Society
HISTORY 163. A History of North American Wests
HISTORY 254. Popular Culture and American Nature
HISTORY 256. U. S.-China Relations: From the Opium War to Tiananmen
HISTORY 260. California's Minority-Majority Cities
HISTORY 261. Race, Gender, and Class in Jim Crow America
HISTORY 265. Writing Asian American History
HISTORY 268E. American Foreign Policy and International History, 1941-2009
HSP 156. History of Women and Medicine in the U.S.
HUMBIO 120. Health Care in America: The Organizations and Institutions that Shape the Health Care System
HUMBIO 120A. American Health Policy
HUMBIO 171. The Death Penalty: Human Biology, Law, and Policy
HUMBIO 172A. Children, Youth, and the Law
LINGUIST 65/265. African American Vernacular English
LINGUIST 156. Language and Gender
MUSIC 8A. Rock, Sex, and Rebellion
MUSIC 17Q. Perspectives in North American Taiko
MUSIC 18A. Jazz History: Ragtime to Bebop, 1900-1940
MUSIC 18B. Jazz History: Bebop to Present, 1940-Present
POLISCI 120B. Parties, Voting, the Media, and Elections
POLISCI 120C. American Political Institutions: Congress, the Executive Branch, and the Courts
POLISCI 123. Politics and Public
POLISCI 124R. Judicial Politics and Constitutional Law: The Federal System
POLISCI 124S. Judicial Politics and Constitutional Law: Civil Liberties
POLISCI 125V. Minority Representation and the Voting Rights Act
POLISCI 137R. Civil Rights at Home and Abroad
POLISCI 221. Tolerance and Democracy
POLISCI 223S. The Imperial Temptation: U. S. Foreign Policy in a Unipolar World
POLISCI 227R. Polarized Politics and Special Interest Groups
PUBLPOL 194. Technology Policy
SOC 118. Social Movements and Collective Action
SOC 119. Understanding Large-Scale Societal Change: The Case of the 1960s
SOC 138. American Indians in Comparative Historical Perspective
SOC 139. American Indians in Contemporary Society
SOC 142. Sociology of Gender
SOC 148. Racial Identity
SOC 149. The Urban Underclass
SOC 155. The Changing American Family
STS 101. Science, Technology, and Contemporary Society
STS 110. Ethics and Public Policy
STS 155. Society in the Age of Robots

At least one of these courses must be a capstone seminar or other group discussion course in the thematic concentration that requires a research paper. The American Studies Program office has a list of courses that satisfy the seminar requirement, but students are encouraged to propose others that fit better with their concentration area. An independent study course with a faculty member culminating in a research paper or an honors project may also fulfill this requirement, with the Director's approval.

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 junior year. To assist students in this task, American Studies offers a pre-honors seminar 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 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. at least 2 courses from category 1 (History and Institutions)
2. at least 2 courses from category 2 (Literature, Art, and Culture)
3. at least 1 course from category 3 (CSRE)
4. AMSTUD 160. Perspectives on American Identity

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, G. William Skinner, George D. Spindler, Robert B. Textor
Chair: James Ferguson
Professors: William H. Durham, James Ferguson, Ian Hodder, Richard G. Klein, Tanya Luhrmann, Lynn Meskell, Sylvia J. Yanagisako
Associate Professors: Paulla Ebron, James A. Fox, Miyako Inoue, Matthew Kohrman, Liisa Malkki, John W. Rick
Assistant Professors: Rebecca Bliege Bird, Melissa J. Brown, David DeGusta, Sarah Lochlann Jain, James Holland Jones (on leave, winter and spring), Ian G. Robertson, Barbara Voss, Michael V. Wilcox
Assistant Professor (Research): Douglas W. Bird
Courtesy Professors: Penelope Eckert, Raymond McDermott
Visiting Associate Professor: Ewa Domanska
Lecturers: Amy Burce, Kathleen Coll, Daniel A. Contreras, Keila Diehl, Carolyn Duffey, Claudia Engel, Susan Glover, Laura Hubbard, Matthew J. Jobin, Cari Kapur, Eliane Karp de Toledo, Alma Kunanbaeva, Sandra Lee, Carolyn Nakamura, Merritt Ruhlen, James Truncer
Consulting Associate Professor: Dominique Irvine
Consulting Assistant Professor: Joanna Mountain
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
Teaching Affiliates: Tania Ahmad, Aisha Beliso De-Jesus, Ana Bezic, Jocelyn Chua, Oded Korczyn, Kristin Monroe, Zhanara Nauruzbayeva, Tiffany Romain, Angel Roque

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

Courses offered by the Department of Anthropology have the subject code ANTHRO, and are listed in the "Anthropology (ANTHRO) Courses" section of this bulletin.

MISSION OF THE DEPARTMENT OF ANTHROPOLOGY

The courses offered by the Department of Anthropology are designed to: (1) provide undergraduates with instruction in anthropology; (2) provide undergraduate majors in anthropology with a program of work leading to the bachelor's degree; and (3) 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 the understanding 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, and 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 various topics and area studies within anthropology 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.

UNDERGRADUATE PROGRAMS IN ANTHROPOLOGY

Beginning in academic year 2007-08, the departments of Anthropological Sciences and Cultural and Social Anthropology merged to form the department of Anthropology. Students who declared a major in Anthropological Sciences or in Cultural and Social Anthropology prior to the academic year 2007-08 should consult the Stanford Bulletin 2006-07 for degree requirements. Such students may continue in their degree program under these requirements, or they may petition for the Bachelor of Arts 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.

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 program coordinator to prepare the checklist for the major and the major planning form. These forms are available at http://anthropology.stanford.edu. Apply in Axess for the B.A. in Anthropology, submit the required forms to the undergraduate student program coordinator 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. Quarterly meetings with the faculty adviser are required.
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 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
6. 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.

7. A grade of 'C' or higher in four ANTHRO essential courses listed at the 100 level or higher and taught by Anthropology faculty.
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, the student must meet with their assigned adviser, create a rigorous course of study based on topical breadth, and obtain adviser approval of an Anthropology emphasis as a course of study.
2. Each quarter, students are required to meet with their adviser before the 'course add' deadline.

Required Courses—

1. *Writing in the Major courses:*
   a. The Anthropology theory courses listed below as required for the corresponding Anthropology emphasis fulfill the Writing in the Major requirement for the B.A. in Anthropology.
   b. For students completing the B.A. in Anthropological Sciences: ANTHRO 90D. (formerly ANTHSCI 190) Social Theory in Anthropological Sciences fulfills the Writing in the Major requirement. The last offering of this course is in Autumn Quarter, 2008-09.
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
   d. Students completing the B.A. degree in Anthropological Sciences must take ANTHRO 90D, Social Theory in Anthropological Sciences. The last offering of this course is in Autumn Quarter, 2008-09.
3. *Methods courses:* Enroll in one of the following according to the student's chosen emphasis:
   a. Archaeology and Heritage: ANTHRO 91A. Archaeological Methods
   b. Culture and Society/Medical Anthropology: ANTHRO 91B. Evidence and Methods in Cultural and Social Anthropology
   c. Ecology, Environment, and Evolution: ANTHRO 91C. Anthropological Methods in Ecology, Environment and Evolution
4. *Essential courses:* Choose from the following according to the student's chosen emphasis:
   a. For the Archaeology and Heritage emphasis the primary essential courses are numbered ANTHRO 100 through ANTHRO 113.
   b. For the Culture and Society emphasis the primary essential courses are numbered ANTHRO 120 through ANTHRO 150.
   c. For the Ecology, Environment, and Evolution emphasis the primary essential courses are numbered ANTHRO 160 through ANTHRO 178.
   d. For the Medical Anthropology emphasis the primary essential courses are numbered ANTHRO 179 through ANTHRO 185.

   Note: Courses may fulfill the essential course requirements for more than one emphasis. See department web site at http://anthropology.stanford.edu for details.
5. *Research courses:* These courses 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.

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 letter of reference from their faculty or honors adviser to the undergraduate student program coordinator no later than the end of the third week of spring quarter (or the third quarter) 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 especially encouraged to apply for summer research funding through the department of Anthropology, the office of 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.

Required Courses—

1. The theory and methods course appropriate to the student's chosen emphasis of study.
2. 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.

Optional Courses—

ANTHRO 92. Undergraduate Research Proposal Writing Workshop
ANTHRO 93. Prefield Research Seminar
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.
ANTHRO 95A. Research in Anthropology is recommended during Autumn and Winter quarters of the senior year.

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.

See http://anthropology.stanford.edu for information about the department's summer research opportunities, including the following: Beagle II, Franz Boas and Pritzker summer scholars programs, the Georgia Sea Islands Cultural Heritage Preservation Project, and Michelle Z. Rosaldo Summer Field Research Grant program.

Note: Required courses for 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.

MINOR IN ANTHROPOLOGY

To declare a minor in Anthropology, contact the department's student peer advisor(s) or the undergraduate student program coordinator 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 program coordinator requesting a faculty advisor assignment and meet with the assigned faculty advisor 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 advisor:
   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 that is 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 advisor, create a rigorous course of study based on topical breadth, and obtain advisor approval for the checklist.
2. Any revisions to the initial checklist must be approved by the faculty advisor before the student graduates.

GRADUATE PROGRAMS IN ANTHROPOLOGY

Beginning in academic year 2007-08, the departments of Anthropological Sciences and Cultural and Social Anthropology merged to form the Department of 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.

MASTER OF ARTS IN ANTHROPOLOGY

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

The Department of Anthropology offers the master's degree to four groups of students:

1. Stanford undergraduates admitted to the coterminal master's program in Anthropology.
2. Stanford graduate students, taking advanced degrees in other departments or schools at Stanford, who are admitted to the terminal M.A. program in Anthropology.
3. Anthropology Ph.D. students at Stanford University who fulfill the M.A. requirements on the way to the Ph.D. degree; and
4. 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 Masters 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 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 COTERMINAL MASTER'S DEGREE PROGRAM /TERMINAL MASTER'S DEGREE PROGRAM

The deadline for graduate applications to the coterminal and terminal M.A. degree programs in Anthropology is March 3, 2009. Prospective applicants should see http://anthropology.stanford.edu for information about application for graduate admission. Successful applicants to the M.A. program may enter only in the following Autumn Quarter. Applicants must file a report of their Graduate Record Examination score electronically and submit a writing sample in English that demonstrates the ability to produce original analytical work at the graduate level. Applicants should also submit three letters of reference, recent original transcripts, and a statement of purpose.

DEGREE OPTIONS

Students may pursue three different 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 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 coursework 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. Choose a self-designed course of study from the Anthropology tracks listed below:
   a. Archaeology
   b. Culture and Society
   c. Ecology and Environment
7. Submit a Graduate Research Proposal approved by the faculty advisor by the end of the first quarter of the Master's degree program.
8. Submit a Master's Degree Program Planning form approved by the faculty advisor by the end of the first quarter of the Master's degree program.
9. Present the Master's Research Project at the department's Master's (Honor's) presentation event in spring quarter.
10. Submit the Master's thesis 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 Heritage and the Ecology and Environment tracks, the thesis can also be a laboratory research paper.

No financial support is available to students enrolled for the M.A. degree.

Required Courses—

1. *Archaeology Track*—Four departmental Review courses which must include ANTHRO 303. Introduction to Archaeology Theory and one additional theory course, and students must 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, and students must take ANTHRO 306. Anthropological Research Methods.
3. *Ecology and Evolution Track*—Four departmental Review courses which must include ANTHRO 302, History and Theory in Evolution and Ecology, and two out of the four following courses: ANTHRO 361A, Advanced Ecological Anthropology; ANTHRO 361, Human Behavioral Ecology; ANTHRO 362, Conservation and Evolutionary Ecology; and ANTHRO 363, Demography and Life History Theory, plus students must take ANTHRO 305, Research Methods in Ecological Anthropology.

Recommended Courses—For all tracks, attendance at the departmental Colloquium each quarter is strongly 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. The deadline for graduate application to the Ph.D. degree program is January 6, 2009. 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.

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 pursuing the Ph.D. degree in Anthropology may pursue one of three tracks in the Ph.D. program. They are Archaeology, Culture and Society, or Ecology and Environment. The students are admitted into one of the three tracks. The tracks are not declarable in Axess.

DEGREE REQUIREMENTS

For students who matriculate beginning 2008-09, 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, signed by their faculty advisor, 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: ANTHRO 303. Introduction to Archaeological Theory (Archaeology track, only); ANTHRO 300, Reading Theory Through Ethnography; ANTHRO 301, History of Anthropological Theory (Culture and Society track, only); ANTHRO 302, History and Theory in Evolution and Ecology, (Ecology and Environment track, only).
   b. pass with a grade of 'B+' or higher, at least one track designated methods course: ANTHRO 307, Archaeological Methods and Research Design (Archaeology track, only); ANTHRO 306, Anthropological Research Methods (Culture and Society track, only); or within the first year pass at least one of two required methods courses—ANTHRO 304, Data Analysis for Quantitative Research, and/or ANTHRO 305, Research Methods in Ecological Anthropology (Ecology and Environment track only).
   c. complete at least 45 units of course work overall 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. required for the Culture and Society track only: Enroll in ANTHRO 311G, Introduction to Culture and Society Studies in Anthropology—Faculty Research, during Winter and Spring quarters for 1-2 units (no more than 5 units total over two quarters).
   g. required for the Ecology and Environment track only: pass with a grade of 'B+' or better (within the first two years) three of the four four following courses: ANTHRO 361A, Advanced Ecological Anthropology; ANTHRO 361, Human Behavioral Anthropology; ANTHRO 362, Conservation and Evolutionary Ecology; and ANTHRO 363, Demography and Life History.
   h. enroll in ANTHRO 444, Anthropology Colloquium and attend the departmental Colloquia series each quarter. Ecology and Environment students may substitute one quarter of attendance in the department Colloquia Series with ANTHRO 312G, Problems in Ecology, Environment and Evolution.
   i. submit a Graduate Research Proposal by the end of the first week in Spring Quarter of the first year.
   j. submit at least one extramural funding application within the first year.
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).
   b. complete at least 40 units of course work in the second year for a total of at least 85 units of course work 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. at the beginning of Autumn Quarter in the second year, attend the teaching assistantship training workshop.
   e. serve as a teaching assistant for at least one quarter in the second year.
   f. by the first day of finals week in Winter Quarter of the second year, recruit a total of four committee members for the qualifying written examinations for topic (two committee members made up of an advisor and a reader) and for area (two committee members made up of an advisor and a reader). At least three of the four readers must be from within the Anthropology Department.
   g. by the first day of finals week in Spring Quarter of the second year, confirm the qualifying written examination schedule, (the written exam to be completed by the first day of finals week in the Winter Quarter of the third year and the oral examination to be completed no later than the beginning of the fourth week of Spring Quarter in the third year).
5. For those whose native language is English, pass, by the end of Spring Quarter of the second year, an examination in a language other than English (see Ph.D. Handbook for details). For those whose native language is not English, demonstrate satisfactory command of English, as evidenced by successful completion of the first two years of graduate study. The examination may be taken through the Stanford Language Center, other Stanford

language departments, or by appointment with the department's language coordinator. The examination format must be approved in advance of the examination by the department's language coordinator.

6. 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.
7. 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.
8. 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, including the approved dissertation proposal, the grant application, and the approved non-medical human subjects protocol, to the faculty adviser.
   b. by November 15th of Autumn Quarter 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, to the student service officer by the first day of finals week in the Autumn Quarter of the third year.
   c. complete the qualifying projects for topic and area (two separate exams to be scheduled approximately one week apart) by the first day of finals week in Winter Quarter, in the third year.
   d. by the beginning of the fourth week in Spring Quarter, schedule and pass the University oral. 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 and confirm approval of non-medical human subjects protocol status and obtain approval if necessary before leaving for dissertation fieldwork.
9. In the fifth year, complete the following requirements:
   a. during the fifth year and after returning from fieldwork, complete one or more teaching assistant quarters in the department.
   b. during two of three quarters (Aut, Win Spr) in the fifth year, students attend a minimum of four of five class meetings of ANTHRO 400, Dissertation Writers Seminar (required of Computer Science track, recommend for Archaeology and Electrical Engineering track students). Each quarter, chapter drafts of the dissertation must be handed in to the dissertation reading committee for review. (All students must be in residence to receive their fifth year funding.)
   c. after submission of the penultimate draft of the dissertation and before the quarter preceding the quarter in which the dissertation will be submitted for Ph.D. degree, students may schedule and deliver an oral presentation of the dissertation in the department.

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 when applying to the program if they wish to be considered for 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. 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 funding applications for summer support. In order to be eligible for department funding of summer fieldwork and research, (usually taken in either the first or second-year and again in the third-year of the Ph.D. degree program) first- through third-year students must submit the department's application establishing eligibility for summer funding. Third-year students who have not secured 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 pre-doctoral research affiliate before leaving for fieldwork. 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 provide a second quarter of teaching assistantship. Fifth-year students who have not secured extramural funding for the sixth year and beyond are advised to make at least two dissertation write-up funding applications and secure extramural or intramural funding for dissertation write-up from the sixth year and beyond.

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
   ANTHRO 303. Introduction to Archaeological Theory
   ANTHRO 307. Archaeological Methods and Research Design
   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
   ANTHRO 304. Data Analysis in the Anthropological Sciences
   ANTHRO 305. Research Methods in Ecological Anthropology
   ANTHRO 444. Anthropology Colloquium

   Ecology and Environment track students must also take three of the four following review courses:
   ANTHRO 361A. Advanced Ecological Anthropology
   ANTHRO 361. Human Behavioral Anthropology
   ANTHRO 362. Conservation and Evolutionary Ecology
   ANTHRO 363. Demography and Life History Theory

PH.D. MINOR IN ANTHROPOLOGY

Prospective Ph.D. minors in Anthropology should request an application from the student service officer.

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 committees (see http://anthropology.stanford.edu for a listing of faculty and office hours).
3. In conjunction with the program adviser, determine a coherent course of study related to the Ph.D. program.
4. Pass with a grade of 'B+' or higher ANTHRO 301, History of Anthropological Theory, two additional ANTHRO theory courses, and one ANTHRO course in a geographical or theoretical area.

APPLIED PHYSICS

Emeriti: (Professors) Steven Chu, Alexander L. Fetter, Theodore H. Geballe, Walter A. Harrison, W. Conyers Herring, Peter A. Sturrock; (*Professors, Research*) Calvin F. Quate, Helmut Wiedemann, Herman Winick; (*Courtesy*) Gordon S. Kino
Chair: Aharon Kapitulnik
Professors: Malcolm R. Beasley, Arthur Bienenstock, Steven M. Block, Philip H. Bucksbaum, Robert L. Byer, Sebastian Doniach, Martin M. Fejer, Daniel S. Fisher, Stephen E. Harris, Aharon Kapitulnik, Mark A. Kasevich, Hideo Mabuchi, Vahé Petrosian, Zhi-Xun Shen, Yoshihisa Yamamoto
Associate Professors: Ian R. Fisher, Kathryn A. Moler
Assistant Professor: Mark J. Schnitzer
Courtesy Professors: Bruce M. Clemens, James S. Harris, Lambertus Hesselink, David A. B. Miller, W. E. Moerner, Douglas D. Osheroff, Stephen R. Quake, Robert H. Siemann, Shoucheng Zhang
Consulting Professors: Thomas M. Baer, Richard G. Brewer, John D. Fox, Bernardo A. Huberman, John R. Kirtley, Richard M. Martin, Stuart S. P. Parkin, Daniel Rugar
Visiting Professor: Enge G. Wang (Autumn)

Department Office: Applied Physics 101
Mail Code: 94305-4090
Phone: (650) 723-4027
Web Site: http://appliedphysics.stanford.edu

Courses offered by the Department of Applied Physics have the subject code APPPHYS, and are listed in the "Applied Physics (APPPHYS) Courses" section of this bulletin.

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, optoelectronics, photonics, quantum optics, 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 Stanford Linear Accelerator Center (SLAC), 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, SLAC, 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 6, 2009. 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, 232; 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, 304, 305; BIO 232; 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, 232; 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: Ian Hodder (Anthropology)
Professors: Ian Hodder (Anthropology), Richard Klein (Anthropology), Mark Lewis (History, Asian Languages), Mike Moldowan (Geological and Environmental Sciences), Gail Mahood (Geological and Environmental Sciences), Lynn Meskell (Anthropology), Ian Morris (Classics, History), Amos Nur (Geophysics), Michael Shanks (Classics), Peter Vitousek (Biology)
Associate Professors: Jody Maxmin (Art and Art History, Classics), John Rick (Anthropology), Jennifer Trimble (Classics)
Assistant Professors: Doug Bird (Anthropology), Giovanna Ceserani (Classics), David DeGusta (Anthropology), Ian Robertson (Anthropology), Barbara Voss (Anthropology), Michael Wilcox (Anthropology)
Associated Staff: Neil Brodie (Director, Cultural Heritage Resource), Laura Jones (Campus Archaeologist), Lisa Newble (Collections Manager), Tom Seligman (Cantor Center)
Fellows: Patrick Hunt, Bill Rathje, James Truncer

Program Offices: Building 500, Main Quad
Mail Code: 94305-2170
Program Phone: (650) 723-5731
Web Site: http://archaeology.stanford.edu

Courses offered by the Archaeology Program have the subject code ARCHLGY, and are listed in the "Archaeology (ARCHLGY) Courses" section of this bulletin.

Human beings and their ancestors have roamed the earth for at least five million years, but only invented writing five thousand years ago. And for most of the period since its invention, writing only tells us about small elite groups. Archaeology is the only discipline that gives direct access to the experiences of all members of all cultures, everywhere in the world. Stanford's Archaeology Program is unique in providing 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 program has three goals:

1. To provide 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.
2. To relate this analysis to the practice of archaeology in the contemporary world.
3. To help each student achieve a high level of understanding through concentrated study of a particular research area.

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.

Archaeology majors are well prepared for advanced training in professional schools such as education, law, and journalism, and, depending on their choice of upper-division courses, graduate programs in the humanities, social sciences, and natural sciences.

UNDERGRADUATE PROGRAMS IN ARCHAEOLOGY

BACHELOR OF ARTS IN ARCHAEOLOGY

The B.A. in Archaeology requires a minimum of 65 units in the major, divided among five components:

1. *Core Program* (20 units), consisting of:
   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 either ANTHRO 304, Data Analysis in Anthropological Science, or ANTHRO 98B, General Methods in Archaeology. Other courses that may satisfy this requirement are PSYCH 10/STATS 60, ECON 102A, and GES 160.
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. Students are required to take at least 5 units from section A, Formation Processes, and at least 5 units from section B, Archaeological Methods. Students are encouraged, whenever possible, to take GES 186, Geoarchaeology, to fulfill the formation processes requirement. With the approval of the instructor and Archaeology director, undergraduates may fulfill part of this requirement from graduate-level courses (i.e., courses with numbers of 200 or higher). *Note:* this list combines historical and current offerings subject to change; contact the Archaeology program administrator for course planning beyond this year and check the web site.

Section A: Formation Processes

GES 1. Fundamentals of Geology	5
GES 49N. Field Trip to Death Valley and Owens Valley	5
GES 102. Earth Materials	5
GES 144. Fundamentals of Geographic Information Science	4
GES 160. Statistical Methods for Earth and Environmental Sciences:General Introduction	5
GES 186/286. Geoarchaeology	5
GEOPHYS 140. Introduction to Remote Sensing	3

Section B: Archaeological Methods

ANTHRO 175. Human Osteology	5
ANTHRO 175B . Advanced Human Osteology	5
ANTHRO 97. Laboratory Methods in Historical Archaeology	5
ANTHRO 91A. Archaeological Methods and Research Design	5
ARCHLGY 109. Archaeogenetics	5
CLASSART 150. Archaeological Fieldwork in the Mediterranean	5
HUMBIO 115. Long-Term Human Interaction with Environment	5

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 (i.e., courses with numbers of 200 or higher). *Note:* the following list is a combination of historical and current offerings; contact the Archaeology administrator for course planning beyond this year and check the web site.

ANTHRO 112. Ethnoarchaeology	5
ANTHRO 90D. Social Theory in the Anthropological Sciences	5
ANTHRO 90A. History of Archaeological Thought	5
ANTHRO 103. Archaeology of Modern Urbanism	5
ANTHRO 134. Object Lessons	5
ARCHLGY 109. Archaeogenetics	5
ARCHLGY 110. Magic, Science and Religion: Archaeological Perspectives	5
HUMBIO 115. Long-Term Human Interaction with Environment	5

5. *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. Some courses, such as ANTHRO 114, Stone Tools in Prehistory, can be taken either to fulfill the skills requirement or as part of an area of concentration. 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.

Concentrations—In addition to the following components, majors must participate in an archaeological field project, and complete a collateral language requirement. *Note:* this list combines historical and current offerings subject to change. Contact the Archaeology program administrator for course planning beyond this year.

Small Scale Societies:

ANTHRO 102 . Archaeology of the American Southwest	5
ANTHRO 112. Ethnoarchaeology	5

Archaeology of Complex Societies:

ARCHLGY 110. Magic, Science and Religion: Archaeological Perspectives	5
ARCHLGY 111. Cultural Heritage in Post-Socialist Europe	5
CLASSART 101. Archaic Greek Art	5
CLASSART 102. Classical and 4th-Century Greek Art	4-5
HUMBIO 115. Long-Term Human Interaction with Environment	5

Mediterranean Archaeology:

ANTHRO 142. Sex, Death and Body in Ancient Egypt	5
ARCHLGY 112. The Archaeology of Early Islam	5
CLASSART 61. The Archaeology of the Greek World	5
CLASSART 81. Introduction to Roman Archaeology	5
CLASSART 101. Archaic Greek Art	5
CLASSART 102. Classical and 4th-Century Greek Art	4-5
CLASSART 105. The Body in Roman Art	3-5

New World Archaeology:

ANTHRO 22. Archaeology of North America	5
ANTHRO 105. Incas and their Ancestors: Peruvian Archaeology	5
ANTHRO 106. Ancient Cities in the New World	5
ANTHRO 101. Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology	5
ANTHRO 102. Archaeology of the American Southwest	5

6. *Archaeological Fieldwork*—Students may meet this requirement in three ways:
   a. ARCHLGY 108A. Archaeological Field Methods
   b. 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 2007-08, field projects were underway in Peru, Rome, Sicily, Switzerland, and Turkey.
   c. 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 Program.

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).

To declare a major in Archaeology, students should contact the program administrator, who provides an application form, answers initial questions, and helps the student select 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.

HONORS PROGRAM

The honors program in Archaeology gives qualified Archaeology majors the chance 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, research on artifacts in Stanford's collections, or fieldwork experiences.

Candidates of sophomore and junior standing with an overall Stanford grade point average (GPA) of 3.0 or better should submit an application to the program administrator no later than the end of the fourth week of Spring Quarter. It must include a brief statement of the project, a transcript, a short paper, and a letter of recommendation from the faculty member who supervises the honors thesis. Students are notified of their acceptance by the undergraduate committee.

Approved candidates must complete all of the requirements for their major and submit an honors thesis no later than four weeks prior to the end of the quarter in which graduation is anticipated. The thesis is read by the candidate's adviser and a second reader appointed by the undergraduate committee. Honors candidates may enroll in one of the honors or thesis courses in Anthropology, Classics, Geological and Environmental Sciences, or Geophysics for up to three quarters during their senior year (15 units maximum). No more than 5 of those units may count toward the 65-unit degree requirement.

COGNATE COURSES

The following is a partial list of cognate courses for Archaeology. Please refer to our program web site for updated lists throughout the year. You can also check with respective department listings for course descriptions and General Education Requirements (GER) information. You can also meet with our Student Advisor about degree requirements and the applicability of these courses to a major or minor program.

ANTHRO 3. Introduction to Prehistoric Archaeology
ANTHRO 6. Human Origins (Same as BIO 106, HUMBIO 6.)
ANTHRO 7. Introduction to Forensic Anthropology
ANTHRO 13. Bioarchaeology
ANTHRO 14. Introduction to Anthropological Genetics (Same as HUMBIO 14.)
ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America
ANTHRO 16N. Ethnographies of North America: An Introduction to Cultural and Social Anthropology
ANTHRO 22. Archaeology of North America
ANTHRO 22N. Maya Hieroglyphic Writing
ANTHRO 28. Indigenous Australia
ANTHRO 90A. History of Archaeological Thought
ANTHRO 90D. Social Theory in the Anthropological Sciences
ANTHRO 91A. Archaeological Methods
ANTHRO 94. Postfield Research Seminar
ANTHRO 98B. Digital Methods in Archaeology
ANTHRO 100A. India's Forgotten Empire: The Rise and Fall of Indus Civilization
ANTHRO 101. The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology
ANTHRO 103.The Archaeology of Modern Urbanism
ANTHRO 105. Ancient Cities in the New World
ANTHRO 109. Archaeology: World Cultural Heritage
ANTHRO 113. Fanual Analysis: Animal Remains for the Archaeologist (Same as BIO 166.)
ANTHRO 114. Prehistoric Stone Tools: Technology and Analysis
ANTHRO 115A. Long-Term Human Interaction with Environment
ANTHRO 130A. Interpreting Space and Place: An Introduction to Mapmaking
ANTHRO 130B. Introduction to GIS in Anthropology
ANTHRO 134. Object Lessons
ANTHRO 162C. Current Issues in Paleoanthropology (Same as BIO 130.)
ANTHRO 169. Communicating Science: Proposals, Talks, Articles
ANTHRO 171. The Biology and Evolution of Language
ANTHRO 175. Human Osteology
ANTHRO 175B. Advanced Human Osteology
ANTHRO 245. The Ancient Maya
ANTHRO 245A. Evolutionary Theory in Archaeology
ANTHRO 290B. Advanced Evolutionary Theory in Anthropological Sciences
ANTHRO 304. Data Analysis in the Anthropological Sciences
ANTHRO 346A. Sexuality Studies in Anthropology
ANTHRO 362. Conservation and Evolutionary Ecology
ANTHRO 374. Beginnings of Social Complexity
ANTHRO 375. Archaeology and Globalism

ANTHRO 380. Practice and Performance: Bourdieu, Butler, Giddens, de Certeau
ANTHRO 307. Archaeological Methods and Research Design
ARCHLGY 1. Introduction to Prehistoric Archaeology
ARCHLGY 102. Archaeological Methods
ARCHLGY 103. History of Archaeological Thought
ARTHIST 101. Archaic Greek Art (Same as CLASSART 101.)
ARTHIST 102. Classical and 4th-Century Greek Art (Same as CLASSART 102.)
ARTHIST 203. Greek Art in and out of Context (Same as CLASSART 109.)
ARTHIST 204A. Appropriations of Greek Art (Same as CLASSART 110.)
CASA 373. Introduction to Archaeological Theory
CLASSART 20. Introduction to Classical Archaeology
CLASSART 21Q. Eight Great Archaeological Sites in Europe
CLASSART 61. Introduction to Greek Archaeology
CLASSART 81. Introduction to Roman Archaeology
CLASSART 113. Ten Things: Science, Technology, and Design (Same as STS 112.)
CLASSART 114. Ceramics: Art and Science
CLASSART 126. Alpine Archaeology
CLASSART 149. Roman Portraits and Persons
CLASSART 250. Cultural Heritage and Classical Antiquities
CLASSART 315. Mapping Rome
CLASSART 323. Archaeology of the Roman Economy
CLASSGEN 119. Gender and Power in Ancient Rome
CLASSGEN 123. Urban Sustainabilty: Long-Term Archaeological Perspectives
CLASSGEN 332. Pragmatogony: Archaeological Perspectives on the Origins of Things
CLASSHIS 101. The Greeks
CLASSHIS 312. Big Ancient History (Same as HISTORY 311G.)
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 7A. An Introduction to Wilderness Skills
GES 49N. Field Trip to Death Valley and Owens Valley
GES 102. Earth Materials
GES 185. Volcanology
GES 186. Geoarchaeology
HUMBIO 115. Long-Term Human Interaction with Environment
HUMBIO 180. Human Osteology
STATS 60. Introduction to Statistical Methods: Precalculus (Same as PSYCH 10.)
URBANST 115. Urban Sustainabilty: 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.

To minor in Archaeology, the student must complete at least 27 units of relevant course work, including:

1. *Core Program* (10 units), consisting of:
   a. *Gateway:* ARCHLGY 1. Introduction to Prehistoric Archaeology (5 units)
   b. *Capstone:* ARCHLGY 103. History of Archaeological Thought (5 units; Writing in the Major)

   ARHCLGY 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 selected from either section in the list above.
3. *Theory* (5 units): topics include archaeological, art-historical, sociocultural, historical, and material-culture theory. The course(s) must be selected from the list given above.
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 selected from the list above. 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.

Students must complete the declaration process (both 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 intended).

ART AND ART HISTORY

Emeriti: (Professors) Keith Boyle, Kristina Branch, Wanda M. Corn, Elliot Eisner, Lorenz Eitner, David Hannah, Suzanne Lewis, Frank Lobdell, Dwight C. Miller, Nathan Oliveira, Richard Randell, Michael Sullivan, Paul V. Turner
Chair: Kristine Samuelson
Area Director for Art History: Maria Gough
Area Director for Film and Media Studies: Kristine Samuelson
Area Director for Art Practice and Director of Undergraduate Studies for Art Practice: Paul DeMarinis
Director of Undergraduate Studies for Art History: Jody Maxmin
Director of Undergraduate Studies for Film and Media Studies: Scott Bukatman
Director of Graduate Studies in Art History: Pamela M. Lee
Director of Graduate Studies in Art Practice: Gail Wight
Director of Graduate Studies in Documentary Film: Jan Krawitz
Professors: Enrique Chagoya (Painting/Drawing/Printmaking), Matthew S. Kahn (Design), Jan Krawitz (Documentary Film), Pamela M. Lee (Contemporary Art), Michael Marrinan (18th- and 19th-century European Art), Kristine Samuelson (Documentary Film), Melinda Takeuchi (Japanese Art), Richard Vinograd (Chinese Art), Bryan Wolf (American Art)
Associate Professors: Scott Bukatman (Film Studies), Paul DeMarinis (Electronic Media), Maria Gough (Modern Art), Jody Maxmin (Ancient Art), Gail Wight (Electronic Media)
Assistant Professors: Terry Berlier (Sculpture), Morten Steen Hansen (Renaissance Art), Pavle Levi (Film Studies; on leave), Jean Ma (Film Studies), Barbaro Martinez-Ruiz (African Art; on leave), Jamie Meltzer (Documentary Film), Bissera Pentcheva (Medieval Art)
Professor (Teaching): Joel Leivick (Photography)
Lecturers: Kevin Bean (Drawing/Painting), Robert Dawson (Photography), John Edmark (Design), Lukas Felzmann (Photography), Jennifer Marshall (American Art; autumn only)
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 and Art HIstory have the subject codes ARTHIST, ARTSTUDI, FILMSTUD, and FILMPROD. Courses in the History of Art are listed in the "Art History (ARTHIST) Courses" section of this bulletin. Courses in the Practice of Art are listed in the "Art Practice (ARTSTUDI) Courses" section of this bulletin. Courses in Film Studies are listed in the "Film Studies (FILMSTUD) Courses" section of this bulletin. Courses in the Practice of Film are listed in the "Film Practice (FILMPROD) Courses" section of this bulletin.

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. degrees in Art with fields of study in Art History or Art Practice; B.A. degree in Film and Media Studies; M.F.A. degrees in Art Practice or Design; M.F.A. degree in Documentary Film and Video; Ph.D. degree in Art History; and a joint Ph.D. in Art History and Humanities.

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.

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, the Middle East, and 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.

BACHELOR OF ARTS IN ART HISTORY

SUGGESTED PREPARATION FOR THE MAJOR

Students considering a major in art history should take ARTHIST 1 during their freshman or sophomore year.

Suggested or Recommended Courses—
ARTHIST 1. Introduction to the Visual Arts

FIELDS OF STUDY OR DEGREE OPTIONS

Students who wish to major in Art History declare the Art major with a field in Art History 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; American; African; Asian; the Americas
4. Interdisciplinary concentrations: art and literature; art and history; art and religion; art and economics; art and medicine.

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 course (including ARTHIST 1), five 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
   b. One other course from ARTHIST 2, ARTHIST 3, FILMSTUD 4
2. Distribution Courses (20 units): In order for students to acquire a broad overview of different historical periods and different geographic regions, majors must take five art history lecture courses from the following five categories: ancient and medieval; Renaissance and early modern; modern, contemporary, and the U.S.; Asia, Africa, and the Americas; film studies.
   a. Ancient and medieval: ARTHIST 101, 102, 105, 106, 107, 108
   b. Renaissance and early modern: ARTHIST 111, 114, 116, 117, 120, 121, 122, 124, 126, 132, 133
   c. Modern, contemporary, and the U.S.: ARTHIST 142, 134A, 145, 145A, 149, 153A, 155, 158A, 159A, 160A, 173
   d. Asia, Africa, and the Americas: ARTHIST 182, 184, 185, 185B, 187, 188A
   e. Film studies: FILMSTUD 100A, 100B, 100C, 101, 102, 111, 112, 112A, 115, 116, 120B, 130, 131, 132, 134A, 141, 150, 152
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 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: The Practice of Art Criticism. 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 should 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. 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 6 courses for a total of 25 units.

1. *Open Track*—ARTHIST 1 plus five lecture courses, colloquia, or seminars in any field.
2. *Modern Track*—ARTHIST 1 plus five lecture courses, colloquia, or seminars in any aspect of 19th- to 20th-century art.
3. *Asian Track*—ARTHIST 2 plus five lecture courses, colloquia, or seminars in Asian Art (ARTHIST 1 may be one of the five courses).
4. *Architecture Track*—ARTHIST 3 plus five lecture courses, colloquia, or seminars in architectural history (ARTHIST 1 may be one of the five courses).

GRADUATE PROGRAMS IN ART HISTORY

The doctoral program in the History of Art 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.

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 two, one quarter assignments in ARTHIST 1, 2, 3, or FILMSTUD 4 are 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*—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, sometime 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 HISTORY OF ART

For a minor in History of Art, 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 participates in the Graduate Program in Humanities leading to the Ph.D. in Art History and Humanities. For a description of this program, see the "Interdisciplinary Studies in Humanities" section of the bulletin.

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.

BACHELOR OF ARTS IN ART PRACTICE (STUDIO) DEGREE REQUIREMENTS

All undergraduate majors complete a minimum of 64 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 64 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 outlines. 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 coursework 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 (23 units):
   a. ARTSTUDI 30. Introductory Survey: Concepts and Strategies. Focus is on direct experiences of multidisciplinary art and art practices.
   b. Five other courses from ARTSTUDI 60, 70, 80, 130, 131, 136, 138, 140, 145, 148, 148A, 148B, 151, 161, 166, 167, 170, 173, 176, 177, 178, 179, 276.
2. Six upper level courses (24 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.
   b. Five other courses from ARTSTUDI 132, 135, 137, 141, 146, 149, 152, 160, 169, 171, 172, 175A, 177A, 179A, 184, 248, 268, 269, 270, 271.
3. Four Art History courses (17 units): ARTHIST 1 and three other art history courses. At least one of the courses must be in the modern art series, ARTHIST 140-159.

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 64 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 51 of the 64 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 (11 units):
   a. ARTSTUDI 30. Introductory Survey: Concepts and Strategies. Focus is on direct experiences of multidisciplinary art and art practices.
   b. Two other courses from ARTSTUDI 60, 70, 80, 130, 131, 136, 138, 140, 145, 148, 148A, 148B, 151, 161, 166, 167, 170, 173, 176, 177, 178, 179, 276.
2. Three upper level courses (12 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.
   b. Two other courses from ARTSTUDI 132, 135, 137, 141, 146, 149, 152, 160, 169, 171, 172, 175A, 177A, 179A, 184, 248, 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.

GRADUATE PROGRAMS 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.

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 has 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 13, 2009. 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: 20 slides of creative work. Some of these can be drawings if relevant to the overall project. Send in a Kodak Universal carousel; no actual work is accepted. All slides must be labeled with the applicant's name, and an accompanying slide list must be included indicating the size, date, and medium of each work. The portfolio can also be in the form of other media such a CD, VHS, DVD, audio media, or other.

FIELDS OF STUDY OR DEGREE OPTIONS

Fields of study for the M.F.A. degree are offered in Painting, Sculpture, New Genres or Photography.

DEGREE REQUIREMENTS

1. *Residency*: Completing a minimum of two years (six quarters) of graduate work in residence at Stanford.
2. *Units*: Completing 48 units of study. Students must discuss their programs of study with the department's student services administrator to ensure that the most favorable registration arrangement is made.
3. *Seminar Requirement*: Six quarters (36 units) of the 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. In addition, 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.
4. *Faculty Reviews*: The student is expected to pass three faculty reviews: (1) at the end of the first quarter (anyone judged to be making inadequate progress is placed on probation and requires an additional review at the end of the second quarter), (2) at the end of the third quarter, and (3) 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.
5. *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.
6. *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.

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 caliber 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. Cross disciplinary 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 has 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 13, 2009. 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.

DEGREE REQUIREMENTS

1. *Residency*: Completing a minimum of two years (six quarters) of graduate work in residence at Stanford.
2. *Units*: Completing 54 units of course work chosen in consultation with an adviser. At least 18 of the 54 units must be in ARTSTUDI 360A,B,C and ME 316A,B,C.
3. *Seminar Requirement*: Participating in a weekly seminar in which the student's work is critiqued and discussed in detail.

Graduate students must remain in residence at Stanford for the duration of the program.

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.

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 also required to take at least one course in the fundamentals of film and video production and should take a studio course in new media.

Suggested or Recommended Courses—
ARTHIST 1. Introduction to the Visual Arts
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; and Aesthetics and Performance. Working with a faculty adviser, students choose at least six courses in their field from course offerings in Art and Art History and other departments across 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
2. FILMSTUD 4. Introduction to Film Study
3. FILMSTUD 5. Introduction to Media Study, *or* FILMSTUD 101. Fundamentals of Cinematic Analysis
4. FILMSTUD 100A, B, C. History of World Cinema I, II, III
5. FILMSTUD 102. Theories of the Moving Image
6. FILMPROD 114. Introduction to Film and Video Production
7. One course in new media, to be approved by the department
8. Concentration: Six 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 two courses 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. 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
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 approved for the Film Studies minor, approved by the 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.

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 allow 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. The film studies, art history, and elective courses provide an intellectual and theoretical framework within which creative work is realized. The parallel emphasis on production and studies prepares students for an academic position that may require teaching both film studies and production.

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 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 an academically demanding 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 film making. Each year, eight students are admitted to the program. Applications and portfolios must be received by January 13, 2009. Students accepted to the program are admitted for the beginning of the following Autumn quarter. No applicants for mid-year entrance are considered.

Portfolio—The department prefers to screen a VHS or 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 film studies courses 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, B.

Required Courses—

1. 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,II
2. Core Film Studies Courses (six courses, 25 units)
   FILMSTUD 4. Introduction to Film Study, or substitute Film Studies elective if comparable course has been taken.
   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
3. Electives (six courses, 24 units): To be chosen in consultation with the student's adviser
   a. Art History—one course, 4 units.
   b. Studio Art and/or Communications—two courses, 8 units
   c. Film Studies—three courses, 12 units

ASIAN LANGUAGES

Emeriti: (Professors) Albert E. Dien, David S. Nivison, Makoto Ueda; *(Associate Professor)* Susan Matisoff; *(Senior Lecturer)* Yin Chuang*

Chair: Chao Fen Sun

Directors of Graduate Studies: James Reichert (Japanese), Chao Fen Sun (Chinese)

Directors of Undergraduate Studies: Melinda Takeuchi (Japanese), Yiqun Zhou (Chinese)

Professors: Steven D. Carter, Mark E. Lewis (Asian Languages, History), Chao Fen Sun, Melinda Takeuchi (Asian Languages, Art and Art History), Ban Wang (Asian Languages, Comparative Literature), John C. Y. Wang

Associate Professors: Yoshiko Matsumoto, James Reichert

Assistant Professors: Haiyan Lee, Indra Levy, Yiqun Zhou

Senior Lecturer: Kazuko Busbin

Consulting Professor: Richard Dasher

Visiting Professor: Stuart Sargent

Postdoctoral Fellows: Alexander Cook (Humanities Fellow), Paul Festa (Asian Languages), Ayelet Zohar (Freeman Spogli Institute for International Studies)

Chinese-Japanese Area Studies Faculty:

Professors: Masahiko Aoki (Economics, emeritus), Carl W. Bielefeldt (Religious Studies), Richard Dasher (Center for Integrated Systems), Peter Duus (History, emeritus), Harold L. Kahn (History, emeritus), Lawrence Lau (Economics), John W. Lewis (Political Science, emeritus), Jean Oi (Political Science), Daniel I. Okimoto (Political Science), David Palumbo-Liu (Comparative Literature), Richard Vinograd (Art and Art History), Andrew Walder (Sociology), Arthur P. Wolf (Anthropology), Lee H. Yearley (Religious Studies)

Associate Professors: Matthew Sommer (History), Kären Wigen (History)

Assistant Professors: Melissa Brown (Anthropology), Miyako Inoue (Anthropology), Matthew Kohrman (Anthropology), Jean Ma (Art and Art History), Thomas Mullaney (History), 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 Asian Languages have the subject codes CHINGEN, CHINLIT, JAPANGEN, JAPANLIT, and KORGEN. Courses in Chinese General are listed in the "Chinese General (CHINGEN) Courses" section of this bulletin. Courses in Chinese Literature are listed in the "Chinese Literature (CHINLIT) Courses" section of this bulletin. Courses in Japanese General are listed in the "Japanese General (JAPANGEN) Courses" section of this bulletin. Courses in Japanese Literature are listed in the "Japanese Literature (JAPANLIT) Courses" section of this bulletin. Courses in Korean General are listed in the "Korean General (KORGEN) Courses" section of this bulletin. Course curricula for these languages may be found in the "Language Center" section of this bulletin.

The Department of Asian Languages offers programs for students who wish to engage with the cultures of China and Japan as articulated in language, linguistics, literature, film, and the newly developing field of cultural studies. Students emerge with a sophisticated understanding of culture as a dynamic process embodied in language and other representational forms, 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 and the Stanford Humanities Fellows program, the Freeman Spogli Institute for International Studies, and the Center for East Asian Studies add to the intellectual vitality of the department.

Asian Languages 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.

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. It also offers an undergraduate minor and a 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, Interdisciplinary Studies in Humanities, Law, Linguistics, Philosophy, Political Science, Religious Studies, and Sociology. Courses in Chinese, Japanese, and Korean language instruction are listed in the "Language Center" section of this bulletin. Students interested in Asian languages not listed should contact the Special Language Program at the Language Center.

OVERSEAS STUDIES

Courses approved for the Asian Languages major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

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 Overseas Studies 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 Overseas Studies Program in Sweet Hall. 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://www.stanford.edu/dept/IUC; stacey.campbell@stanford.edu; 650-725-1490). Stanford is a member of these consortia programs.

Students interested in the 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.

ASIAN LANGUAGES COURSES

WIM indicates that the course satisfies the Writing in the Major requirements.

Students interested in literature and literary studies should also consult course listings in the departments of Classics, Comparative Literature, English, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese, and in the Program in Modern Thought and Literature.

Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages.

Since unavoidable changes occasionally have to be made in course offerings after the *Stanford Bulletin* has gone to print, students are advised to consult the department each quarter.

For possible future offerings, see http://www.stanford.edu/dept/asianlang/courses

UNDERGRADUATE PROGRAMS IN ASIAN LANGUAGES

BACHELOR OF ARTS PROGRAMS IN ASIAN LANGUAGES

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. Concentrations 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)
      2. second-year modern Chinese (one of the following series: CHINLANG 21, 22, 23, or CHINLANG 21B, 22B, 23B, or CHINLANG 25)
      3. beginning classical Chinese (CHINLIT 125, 126, 127)

c. three courses offered by Asian Languages at the 100 level with one in each of the following areas: pre-modern China, modern China, and Chinese language/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.

2. Concentrations 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 7B, 8B, 9B, or JAPANLNG 10)
      2. second-year modern Japanese (one of the following series: JAPANLNG 21, 22, 23, or JAPANLNG 17B, 18B, 19B, or JAPANLNG 20)
      3. third-year modern Japanese (one of the following series: JAPANLNG 101, 102, 103, or JAPANLNG 127B, 128B, 129B, or JAPANLNG 130)
   c. three courses offered by Asian Languages at the 100 level with one in each of the following areas: pre-modern Japan, modern Japan, and Japanese language/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 WIM course.

   JAPANGEN 71N can be used to satisfy the Japanese language/linguistics area requirement. JAPANGEN 51/251 and JAPANLNG 130 are 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 language/linguistics can substitute the four other content courses primarily at the 100 level with LINGUIST 1 and three other linguistic 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, when the student may enroll in CHINLIT 189B or JAPANLIT 189B for 2 units of credit for independent study. 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. In Winter Quarter, students enroll for 5 units in directed reading (CHINLIT 189A or JAPANLIT 189A) 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 who did not enroll in a 189B course in junior year may enroll in CHINLIT 189B or JAPANLIT 189B in Spring Quarter of senior year while revising the thesis, if approved by the thesis supervisor. 10-12 units of credit are granted for honors course work and the finished thesis.

MINOR IN ASIAN LANGUAGES

The undergraduate minor in Asian Languages has 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 minor consists of:

1. Completion of one year of language study at the second-year level (that is, CHINLANG 21, 22, 23 or 21B, 22B, 23B; or JAPANLNG 21, 22, 23 or 17B, 18B, 19B) 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 101, 102, 103 or 127B, 128B, 129B) before undertaking any training in the Department of Asian Languages. 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, or they may be advanced literature and linguistics courses, depending on the capabilities and interests of the student in question.
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. All courses for the minor must be completed with a GPA of 2.0 or better.

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 B.A. AND M.A. PROGRAMS IN ASIAN LANGUAGES

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. A Graduate Record Examination (GRE) score is not required. For details, see the "Graduate Degrees" section of this bulletin or http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN ASIAN LANGUAGES

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, and Japanese linguistics.

MASTER OF ARTS PROGRAMS IN ASIAN LANGUAGES

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 for a letter grade of 'B' or higher of third-year Chinese through CHINLANG 103 and
   b. advanced classical Chinese through CHINLANG 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 postgraduate 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 127B, 128B, 129B) plus one of the following:
   a. fourth-year Japanese through JAPANLANG 213, or
   b. classical Japanese through JAPANLANG 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 for a letter grade of 'B' or higher:
   a. four adviser-approved courses in Japanese literature or linguistics from among the offerings of the Department of Asian Languages, 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 ASIAN LANGUAGES

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, 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 (see "Study Abroad" in the Asian Languages section of this bulletin) 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 coursework 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.

A candidate must fulfill the following requirements:

1. Meet 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 coursework, 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 two relevant seminars at the 300 level. These seminars must be in different subjects.
4. Pass a set of four comprehensive written examinations, one of which tests the candidate's methodological competence in the relevant discipline. The remaining three fields are chosen, with the approval of the graduate adviser in consultation with the student's individual adviser, from the following: anthropology, art, Chinese literature (for candidates emphasizing Chinese linguistics), history, Japanese literature, linguistics (for candidates emphasizing Chinese literature), 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 four examinations.
5. 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.
6. 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.
7. Submit a dissertation demonstrating ability to undertake original research based on primary 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 coursework 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 coursework and research is deemed equivalent to departmental requirements for the Ph.D. track.

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 JAPANLANG 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 (JAPANLANG 248 and/or 249), and
   b. first-year classical Chinese (CHINLIT 125, 126, 127)
3. Complete four adviser-approved courses in Japanese literature and/or linguistics numbered between 260 and 298, and two relevant seminars at the 300 level. These seminars must be in different subjects.
4. Complete two upper-division or graduate-level courses in fields such as Japanese anthropology, art, history, philosophy, politics, and religion, as approved by the graduate adviser in consultation with the student's primary adviser.
5. Complete JAPANLIT 201: Introduction to Graduate Study in Japanese.
6. Pass a set of four comprehensive qualifying examinations. One tests the candidate's breadth and depth in the primary field of research; one tests the candidate's methodological competence in the relevant discipline. The remaining two examinations test the candidate's competence in supporting fields, which are chosen in consultation with the student's primary adviser in accordance with the student's particular research goals.
   Supporting fields may include, but are not limited to, the following: anthropology, art, Chinese literature, comparative literature, history, Japanese literature (for candidates emphasizing Japanese linguistics), linguistics (for students emphasizing Japanese literature), philosophy, and religion. With the adviser's approval, a Ph.D. minor in a supporting field may be deemed equivalent to the successful completion of one of these four qualifying examinations.
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.

PH.D. MINOR IN ASIAN LANGUAGES

A student taking a minor in Asian Languages 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 elect either CHINLIT 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.

ASTRONOMY

Emeriti: (Professors) Ronald N. Bracewell, 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), Steven Kahn (Physics, SLAC), Peter Michelson (Physics, SLAC), Vahé Petrosian (Physics, Applied Physics), Roger W. Romani (Physics)
Associate Professors: Tom Abel (Physics, SLAC), Sarah Church (Physics)
Assistant Professors: Steve Allen (Physics, SLAC), 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, and are listed in the "Physics (PHYSICS) Courses" section of this bulletin.

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.

MINORS

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 164, in addition to the 40 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 in the future, space observations by GLAST. 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. Astrophysics Laboratory
PHYSICS 312. Basic Plasma Physics
PHYSICS 360. Physics of Astrophysics
PHYSICS 361. Stellar and Galactic Astrophysics
PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology (not given 2008/09)
PHYSICS 363. Solar and Solar-Terrestrial Physics (not given 2008/09)
PHYSICS 364. Advanced Gravitation
PHYSICS 463. Special Topics in Astrophysics: Theoretical Cosmology (not given 2008/09)

ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

Emeriti: (Professor) Wesley K. Ruff; *(Athletic Director)* Joseph H. Ruetz; *(Associate Director)* Robert C. Young; *(Assistant Director)* Shirley Schoof
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
Senior Assistant Athletic Director, Media Relations: Jim Young
Assistant Athletic Director, Compliance Services: Megan Boone
Assistant Athletic Director, Facilities: Skip Braatz
Assistant Athletic Director, Student Services: Susan Burk
Assistant Athletic Director, Marketing: Bob Carruesco
Assistant Athletic Director, Human Resources: Ron Coverson
Assistant Athletic Director, Facilities, Operations, and Events: Carl Reed
Assistant Athletic Director, Capital Planning: David Schinski
Senior Lecturer: Anne Gould
Sport Directors: Al Acosta (Lightweight Crew, women), Craig Amerkhanian (Crew, men), Amy Bokker (Lacrosse), 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), Caroline O'Connor (Golf, women), Heather Olson (Synchronized Swimming), George Pogosov (Fencing), Lisa Posthumus (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: Jessica Allister (Softball), Lance Anderson (Football), Jon Barnea (Water Polo, men), Alison Bartosik (Synchronized Swimming), Rob Becerra (Soccer, men), Jason Borrelli (Wrestling), Frankie Brennan (Tennis, women), Andy Buh (Football), Jay Cooney (Soccer, women), Denise Corlett (Volleyball, women), Brandon Coupe (Tennis, men), Chris Dalman (Football), Dick Davey (Basketball, men), Tim Drevno

(Football), DJ Durkin (Football), Trisha Ford (Softball), Mandy Hart (Field Hockey), Vaclav Kacir (Crew, women), Bobbie Kelsey (Basketball, women), Ted Knapp (Swimming, men), Kris Mack (Track and Field), Jason Mansfield (Volleyball, women), Salimah Mussani (Golf, women), Dave Nakama (Baseball), Valeriy Naulo (Fencing), Andrew Ninow (Track and Field), Gregg Olson (Soccer, men), Susan Ortwein (Water Polo, women), Kate Paye (Basketball, women), J.D. Reive (Gymnastics, men), David Shaw (Football), Ken Shibuya (Volleyball, men), Jordan Steele Marotta (Field Hockey), Erik Storck (Sailing), 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 have the subject code ATHLETIC, and are listed in the "Athletics, Physical Education, and Recreation (ATHLETICS) Courses" section of this bulletin.

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 undergraduate 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 payable only by check or money order payable to Stanford University. Cash is not acceptable. Fees are payable at the first, and are required by the second, class meeting for a student to remain in class. Late enrollees must submit fees no later than the second time they attend the class.

Full refund is given to students who drop a class during the first two weeks of classes and request a refund at that time. No refund is given if a student either neglects to request a refund under the conditions listed previously or drops the class after the second week.

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 attendance and, for whatever reason, did not get registered until the beginning of the fourth week (the University deadline for adding courses).

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 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, Donald Kennedy, Peter Ray, Robert Schimke, Norman K. Wessells, Dow O. Woodward, Charles Yanofsky;** *(Professor, Research)* R. Paul Levine**
Chair: Robert D. Simoni
Professors: Barbara A. Block, Steven M. Block, Allan M. Campbell, Martha S. Cyert, Gretchen C. Daily, Mark W. Denny, Rodolfo Dirzo, Paul R. Ehrlich, David Epel, Marcus W. Feldman, Russell D. Fernald, Christopher B. Field, William F. Gilly, Deborah M. Gordon, Philip C. Hanawalt, H. Craig Heller, Patricia P. Jones, Richard G. Klein, Ron R. Kopito, Sharon R. Long, Liqun Luo, Susan K. McConnell, Harold A. Mooney, W. James Nelson, Stephen R. Palumbi, Joan Roughgarden, Robert M. Sapolsky, Stephen H. Schneider, 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: Judith Frydman, Elizabeth A. Hadly, Fiorenza Micheli, Dmitri Petrov
Assistant Professors: Dominique Bergmann, William F. Burkholder, Tadashi Fukami, Or Gozani, Mary Beth Mudgett, Mark J. Schnitzer, Kang Shen, Jan M. Skotheim
Assistant Professor (Research): Anthony De Tomaso
Courtesy Professors: Joseph Berry, Daniel Fisher, Wolf Frommer, Arthur R. Grossman, Terry Root, Irving Weissman, Wing Wong
Courtesy Associate Professors: Kathryn Barton, Alfred M. Spormann
Courtesy Assistant Professor: Zhiyong Wang
Lecturers: Waheeda Khalfan, Shyamala D. Malladi, Angela Lee Riepel, James Watanabe
Consulting Professors: Cathy Laurie, Catherine Squires, Marc Tessier-Lavigne
Librarian: Michael Newman

* Recalled to research.

** Recalled to active duty.

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 have the subject code BIO, and are listed in the "Biology (BIO) Courses" section of this bulletin.

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. An undergraduate major in Biology serves as preparation for professional careers, including medicine, dentistry, veterinary sciences, teaching, consulting, research, and field studies. For undergraduate students, the department offers courses and research opportunities that can satisfy either a general or specific interest in the various fields of biology. 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 facilities and personnel of the Department of Biology are housed in the Gilbert Biological Sciences Building, Herrin Laboratories, Herrin Hall, the Jasper Ridge Biological Preserve, the James H. Clark Center, the Lorry I. Lokey Laboratory Building and the Carnegie Institution of Washington on the main campus, and at the 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.

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. 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, immediately following this section.

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 the Hopkins Marine Station.

UNDERGRADUATE PROGRAMS IN BIOLOGY

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 schedules, 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 information handouts.

Each undergraduate interested in the Biology major is required to select a department faculty adviser as part of the major declaration process. Students who plan to attend medical or graduate school, enroll in the honors or coterminal programs, take courses at Hopkins Marine Station, or attend one of the overseas campuses may find their faculty adviser particularly helpful.

TRANSFER STUDENTS

Because of differences between Stanford undergraduate courses and prerequisites and those of many other institutions, transfer students may face problems not encountered by entering freshmen. Transfer students are urged to visit the student services office in Gilbert 108 during transfer orientation to obtain information on course credit evaluations. Course catalogs, syllabi, and/or lecture notes from the former institution are necessary in the evaluation and accreditation process. Transfer students are encouraged to find a faculty adviser soon after arrival.

All transfer courses intended to fulfill department requirements must be evaluated on Evaluation of Course Content forms available in the student services office or downloadable at http://biology.stanford.edu/student_resources/eval_course_content.pdf; these forms are kept in the student's file. This department procedure is in addition to the Registrar's process of having units earned at other institutions transferred for Stanford credit that appear on the Stanford transcript.

The department authorizes transfer credit only for courses whose content parallels the Stanford courses and that have comparable prerequisites (not merely a comparable course title). To substitute a course taken elsewhere for an upper-division Stanford course, course content must be approved by a department faculty member teaching in the area of the course. Submit as complete a course description as practical (including prerequisites and their descriptions) using the Evaluation of Course Content form available in the student services office before taking an off-campus course. Students must provide exams, reading lists, term papers, and other materials for the evaluation. Credit is not allowed for projects for which the student was paid, nor is credit allowed for work of a purely technical or clinical nature. Academic performance is verified upon receipt of the official transcript.

REQUIREMENTS FOR PREHEALTH PROFESSIONS

Students who are not biology majors should take at least BIO 41, 42, 43, 44X, 44Y, and such upper-division electives as may be recommended by Undergraduate Advising and Research.

BACHELOR OF SCIENCE IN BIOLOGY

The undergraduate major in Biology serves as preparation for professional careers, including medicine, dentistry, veterinary sciences, teaching, consulting, research, and field studies.

REQUIREMENTS

Candidates for the general Biology B.S. degree must complete:

Core Courses—must be taken for a letter grade, including Writing in the Major courses:

Subject and Catalog Number	*Units*
BIO 41	5
BIO 42	5
BIO or BIOHOPK 43	5
BIO 44X	4
BIO or BIOHOPK 44Y* may be replaced by 4 units of BIOHOPK 175H	4

* 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	8 or 4
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	10
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 field of ecology and evolutionary biology.

** If taken to fulfill the foundational breadth requirement, these courses do not count toward the 24 elective unit requirement.

Electives—24 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 in the student services office or by downloading http://biology.stanford.edu/student_resources/out_of_dept_electives.pdf. Up to 6 units of teaching and research are allowed and up to 6 units can be taken credit/no credit. Stanford Introductory Seminars may not be used to fulfill this requirement.

Elective courses are typically taken during the junior and senior year and should include a total of 24 elective units beyond the core. The courses making up these units must include at least one course from at least three of the following four central menu areas. The rest of the 24 units can include more courses from this central menu, other Biology or Hopkins Marine Station courses, courses listed on the approved out-of-department elective list, or advanced courses for which menu courses are prerequisites. A complete central menu course listing including inactive and alternate year courses is available in the student services office or by downloading http://biology.stanford.edu/student_resources/central_menu.pdf.

Active central menu courses are:

1. *Molecular*
   - BIO 104. Advanced Molecular Biology
   - BIO 113. Fundamentals of Molecular Evolution[3]
   - BIO 118. Genetic Analysis of Biological Processes[1]
   - BIO 133. Genetics of Prokaryotes[1]
   - BIO 134. Replication of DNA[1]
   - BIO 160A. Developmental Biology and Signal Transduction I[1]
   - BIO 160B. Developmental Biology and Signal Transduction 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*
   - 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 133. Genetics of Prokaryotes[1]
   - BIO 134. Replication of DNA[1]
   - BIO 137. Plant Genetics[1]
   - BIO 154. Molecular and Cellular Neurobiology[2]
   - BIO 158. Developmental Neurobiology[2]
   - BIO 160A. Developmental Biology and Signal Transduction I[1]
   - BIO 160B. Developmental Biology and Signal Transduction II[1]
   - BIO 230. Molecular and Cellular Immunology[1]
   - CBIO 101. Cancer Biology[1]
   - CEE 274A. Environmental Microbiology I
3. *Organismal*
   - 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
   - BIO 213. Biology of Viruses
   - 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*
   - 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
   - BIO 185. Evolution of Reproductive Social Behavior
   - BIOHOPK 163H. Oceanic Biology
   - 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 either area I or area II or area IV requirement.

No more than 6 units from any combination of individual instruction courses (BIO 198, 198X, 199, 199X, 290, 290X, 291, 300, 300X; BIOHOPK 175H, 198H, 199H, 290H, or 300H) 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.

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 and Education) 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 during the junior or senior year, 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. Full descriptions of Hopkins Marine courses are listed in the "Courses in Biology, Hopkins Marine Station" section of this bulletin. 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 168H. Molecular Ecology Data Analysis
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 188H. Experimental Sensory Ecology
BIOHOPK 274. Hopkins Microbiology Course (6 units maximum)
BIOHOPK 277H. Biomechanics, Ecological Physiology, and Genetics of Intertidal Communities
BIOHOPK 310H. Intertidal Natural History

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. Principles of Biology*	5		
BIO 42. Principles of Biology*		5	
BIO *or* BIOHOPK 43. Principles of Biology*			5
BIO 44X. Core Experimental Laboratory		4	
BIO *or* BIOHOPK 44Y. Core Experimental Laboratory			4
CHEM 130, 131, 135 (or 171). Organic and Physical Chemistry	8	3	
General Education Requirements or electives	3	5	8
Totals	16	17	17

* Letter grade only.

THIRD YEAR

PHYSICS 21, 22, 23, 24. Introductory Physics	4	4	
General Education Requirements or electives	11	11	11
Totals	15	15	11

FOURTH YEAR

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; they appear on the transcript but not on the diploma. Candidates for the B.S. degree in Biology with a field of study are expected to complete the departmental honors program as well as the set of requirements outlined below. Students in a field of study must have their checklist signed by their advisers and submitted to the student services office by the end of junior year. Students may petition in advance for the substitution of either equivalent or more advanced courses using the General Petition, available in the student services office or by downloading http://biology.stanford.edu/student_resources/general_petition.pdf.

BIOCHEMISTRY AND BIOPHYSICS

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	4
BIO *or* BIOHOPK 44Y	4
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	8 or 4
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	5 or 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 192	3
BIOMEDIN 210	3
BIO 152/MCP 222	3
BIO 154	4
CHEM 232/CHEMENG 452	3
MCP 256	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

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

Writing in the Major (one of the following):

BIO 44X	4
BIO or BIOHOPK 44Y	4
BIO 145*	4
BIO 185*	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	8 or 4
CHEM 33, 35, 36	11
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45 or 28, 29	8 or 12
MATH 41, 42	10

Required Evolutionary Biology Course (one of the following; must be taken for a letter grade):

BIO 113/244	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
BIO 221	4
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 102, 117, 118, 121, 124, 125, 139, 144, 145, 146, 147, 175, 183, 184, 185, 215, 216; BIOHOPK 163H, 171H; CHEM 130, 131; EARTHSYS 144/EESS 164; EESS 134, 158; GES 123, 240; OSPAUSTL 10*, 20*, 30*.

* Only 2 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

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	4
BIO *or* BIOHOPK 44Y	4
BIO 145	4
BIO 185	3
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	8 or 4
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45	8 or 12
MATH 41, 42 *or* 19, 20, 21	10
STATS 60 *or* BIO 141 *or* BIOHOPK 174H	5 or 4-5 or 3

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 *or* 171H	5-8 or 4
BIOHOPK 163H	4
BIOHOPK 166H	5
BIOHOPK 172H	5

Approved courses (one of the following; must be taken for a letter grade):

BIOHOPK 175H	10
BIOHOPK 182H	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

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	4
BIO *or* BIOHOPK 44Y	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	8 or 4
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 *or* 41, 43, 45	8 or 12
MATH 19, 20, 21 *or* 41, 42	10
BIO 141* *or* BIOHOPK 174H*	4-5 or 3

* 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 133	4
BIO 177	3
BIO 213	4-5
BIO 230	9-12
BIOHOPK 274	4
CEE 177	3
CEE 274A	3
CEE 274B	3
CEE 274D	3
MI 104	3
MI 211	3
MI 212	

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

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	4
BIO or BIOHOPK 44Y	4
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	8 or 4
CHEM 33, 35, 36, 130, 131	18
CHEM 135 or 171	3
PHYSICS 21, 22, 23, 24 or 41, 43, 45	8 or 12
MATH 41, 42 or 19, 20, 21	10
STATS 60 or BIO 141*	5 or 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

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	4
BIO or BIOHOPK 44Y	4
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	8 or 4
CHEM 33, 35, 36, 130, 131	18
PHYSICS 21, 22, 23, 24 or 41, 43, 45	8 or 12
MATH 41, 42 or 19, 20, 21	10
STATS 60 or BIO 141*	5 or 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 or 3
BIO 129A or 129B or 160A or 160B	4
BIO 150 or 163	5 or 4
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 Biology, 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.

For further information on the fields of study, including detailed descriptions of their requirements and deadlines, see http://biology.stanford.edu/programs.html.

HONORS

To graduate with departmental honors, a student must:

1. Submit an honors petition proposal to the department's undergraduate research coordinator by the fifth Friday of the quarter, 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 usually at the end of May. If graduating Autumn, Winter, or Summer Quarter, produce a poster.
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 office of the undergraduate research coordinator in Gilbert 118, as well as on the web at http://biohonors.stanford.edu. Questions should be directed to the undergraduate research coordinator, Dr. Angela Lee (angelee@stanford.edu, 650-723-3767, Gilbert 118).

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 (BIO 44X and BIO 44Y) does 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 (available in the student services office or downloadable at http://biology.stanford.edu/student_resources/out_of_dept_electives.pdf).
8. Elective credit for research (BIO 199 or BIOHOPK 199H) is limited to a maximum of 3 units.

COTERMINAL B.S. AND M.S. DEGREES IN BIOLOGY

The Department of Biology admits a limited number of undergraduates to the coterminal B.S. and M.S. degree program in Biology. Current Stanford students may apply to the program after they have earned a minimum of 120 units toward graduation (UTG) and at least one quarter prior to conferring the undergraduate degree; for example, if a student expects to have the B.S. conferred in Spring Quarter, the student must apply no later than the third week of Winter Quarter. The application includes a statement of purpose, an unofficial Stanford transcript, official GRE score print-out, two letters of recommendation from faculty members in this department (if two such letters are not available, a letter from someone outside the department can be used in lieu of one of those), a program proposal listing the courses in which they intend to enroll to fulfill degree requirements, a course transfer form, and an application fee of $50. Students must meet all requirements except the electives for the B.S. degree, and all requirements for the M.S. degree in Biology.

Unit requirements for a coterminal program are 180 units for the bachelor's degree and 45 units for the master's degree.

Coterminal students are permitted to use course work taken up to two quarters immediately prior to their first graduate quarter toward their graduate degree.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN BIOLOGY

TEACHING CREDENTIALS

For information concerning the requirements for teaching credentials, consult the "School of Education" section of this bulletin or address an inquiry to the Credential Administrator, School of Education.

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.

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. However, course work equivalent to the Stanford B.S. in Biology is recommended. 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.

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, foundational breadth courses, and/or research and teaching.
   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, 176H, 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. The remaining 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, available in the student services office or downloadable at http://biology.stanford.edu/student_resources/general_petition. pdf.

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.

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. Students may take only 6 units CR/NC and must receive a grade of 'B-' or better in all courses taken for the degree.

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. 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 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 should apply online at http://gradadmissions.stanford.edu. The department's program is divided into three separate tracks: ecology/evolution/population biology; integrative/organismal; and molecular/cellular/developmental/genetic/plant. Included in these tracks is the option to conduct research at Hopkins Marine Station. These concentrations are reported to the department; they are not declared on Axess.

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 only 10 percent of the applicants.

Qualified applicants should apply for nationally competitive predoctoral fellowships, especially those from 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. Course work is planned in consultation with an advising committee assigned for a student's track. In addition, students must take a course on the ethical conduct of research: BIO 312 for the ecology/evolution/population biology track; MED 255 for the integrative/organismal and molecular/cellular/developmental/genetic/plant tracks.
2. 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. Three quarters of teaching are required for ecology, evolution, and population biology students.
3. 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 faculty members.
4. By June 1, each first-year student is expected to have selected a lab in which to perform dissertation research and to have been accepted by the faculty member in charge. Students and faculty must wait until April 1 to discuss the choice of a dissertation lab.
5. 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. Advancement to candidacy depends on satisfactory completion of the dissertation proposal.

6. Third year and beyond: each student must meet with the advising committee at the beginning of the third year, and each year thereafter prior to the end of the Spring Quarter. Advanced students are required to meet with their committee at least twice a year.
7. Residency requirement: a minimum of 135 units of graduate registration is required of each candidate.
8. The doctoral dissertation must be presented to an oral examination committee comprised of at least five faculty members. In addition, the final dissertation must be approved by the student's reading committee, comprised of at least three faculty members and by a graduate degree progress officer in 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 track.

Molecular, Cellular, Developmental, Genetic, and Plant Track—

1. *First year:*
   a. *advising committee:* shortly after arrival, each entering student meets with the first-year advising committee. 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 (below) is required of all students.
   b. *core curriculum:** students are required to take the following courses for a letter grade, unless previous course work has fulfilled these requirements:

   BIO 203. Advanced Genetics
   BIO 214. Advanced Cell Biology
   BIO 301. Frontiers in Biology: satisfies first-year talk requirement; must be taken Autumn and Winter quarters.

   One of the following:
   BIOC/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

   Three additional courses in the student's area of interest, or as advised by committee.

   a. *Lab rotations:** first-year students are required to complete rotations in 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 qualifying exam.
   a. *dissertation proposal:* during Winter and Spring quarters of the second year, the student must prepare a 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 proposal to the dissertation advising committee. 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. The written proposal is due by March 31 and the oral defense must take place no later than May 1. Failure to complete these requirements on schedule results in formal warnings and eventual dismissal from the program.
3. *Third year and beyond:*
   a. *dissertation and dissertation defense:* a completed draft of the dissertation must be turned in to the student's oral examination committee at least one month before the oral exam is scheduled to take place. See University guidelines for the composition of this committee in the "Graduate Degrees" section of this bulletin.

Integrative/Organismal Track—

1. *First year:*
   a. *advising committee:* shortly after arrival, each entering student meets with the first-year advising committee. 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.
   b. *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 such as DBIO 210; MCP 215; NBIO 206, 216; or PSYCH 228.
   c. *first-year paper:* students must submit a paper that is evaluated by the advising committee before the end of Spring Quarter of the first year. 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. The first-year paper must be evaluated by a minimum of two faculty members.
2. *Second year:*
   a. *dissertation proposal:* during Spring quarter of the second year, the student must prepare a 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 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. Failure to complete these requirements on schedule will result in formal warnings and eventual dismissal from the program.
3. *Third year and beyond:*
   a. *dissertation and dissertation defense:* a completed draft of the dissertation must be turned in to the student's oral examination committee at least one month before the oral exam is scheduled to take place. See University guidelines for the composition of this committee in the "Graduate Degrees" section of this bulletin.

Ecology, Evolution, and Population Biology Track—

1. *First year:*
   a. *advising committee:* each entering student is assigned a first-year advising committee whose function is to develop a schedule of required and recommended courses and to meet once each quarter with the student during the first year.
   b. *core curriculum:* Students are required to take BIO 302, 303, 304, Current Topics and Concepts in Population Biology, Ecology, and Evolution.
   c. *first-year paper:* each student must submit a paper that is evaluated by the advising committee before the end of Spring Quarter of the first year. 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. The first-year paper must be evaluated by a minimum of two faculty members.
2. *Second year:*
   a. *dissertation proposal:* during Spring quarter of the second year, the student must prepare a 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 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. Failure to complete these requirements on schedule will result in formal warnings and eventual dismissal from the program.
3. *Third year and beyond:*
   a. *dissertation and dissertation defense:* a completed draft of the dissertation must be turned in to the student's oral examination committee at least one month before the oral exam is scheduled to take place. See University guidelines for the composition of this committee in the "Graduate Degrees" section of this bulletin.

BIOLOGY, HOPKINS MARINE STATION

Emeriti: (Professor) John H. Phillips, Jr.
Director: Stephen R. Palumbi
Associate Director: George N. Somero
Professors: Barbara A. Block, Mark W. Denny, David Epel, William F. Gilly, Stephen R. Palumbi, George N. Somero, Stuart H. Thompson
Associate Professor: Fiorenza Micheli
Assistant Professor (Research): Anthony DeTomaso
Lecturer: James Watanabe

Station Offices: 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 "Courses in Hopkins Marine Station" 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 ten 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 Student Services Office to see what specific courses at Hopkins can 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 available at http://hopkins.stanford.edu.

BIOPHYSICS

Emeritus: Harden M. McConnell (Chemistry)
Director: William I. Weis
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), Xiaoyuan Chen (Radiology), Jennifer Cochran (Bioengineering), Miriam Goodman (Molecular and Cellular Physiology), Merritt Maduke (Molecular and Cellular Physiology), Jianghong Rao (Radiology), Mark Schnitzer (Biology, Applied Physics), 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 have the subject code BIOPHYS, and are listed in the "Biophysics (BIOPHYS) Courses" section of this bulletin.

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
   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 and expressing 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 research. The examination is preceded by a public seminar in which the research is presented by the candidate.

CHEMISTRY

Emeriti: (Professors) John I. Brauman, James P. Collman, Carl Djerassi, Harden M. McConnell, John Ross, Eugene E. van Tamelen
Chair: Richard N. Zare
Vice Chair: Wray H. Huestis
Professors: Hans C. Andersen, Steven G. Boxer, Hongjie Dai, Michael D. Fayer, Keith O. Hodgson, Wray H. Huestis, Chaitan Khosla, Eric T. Kool, W. E. Moerner, Robert Pecora, 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, Dmitry V. Yandulov
Courtesy Professors: Stacey F. Bent, Curtis W. Frank, Daniel Herschlag
Courtesy Associate Professor: Karlene A. Cimprich
Courtesy Assistant Professors: James K. Chen, Thomas J. Wandless
Lecturers: John A. Flygare, Hillary Hua, Christopher R. Moylan
Director of Undergraduate Laboratories: Christopher R. Moylan

* 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://www.stanford.edu/dept/chemistry

Courses offered by the Department of Chemistry have the subject code CHEM, and are listed in the "Chemistry (CHEM) Courses" section of this bulletin.

Chemistry is central to many scientific disciplines and plays an important role in the emerging areas of biotechnology and material science. Fluorescent imaging of biological molecules, modeling of protein folding, 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 reactivity of molecules as small as dihydrogen or synthesizing large polymer assemblies. The ability to synthesize new molecules and materials and to modify existing structures allows the exploration of properties of well-defined systems through systematic modification. The Chemistry department has a long-standing tradition of encouraging undergraduate majors to become involved in research during the academic year and through the 10-week Bing Summer Research Program.

UNDERGRADUATE PROGRAMS IN CHEMISTRY

CHEMISTRY PREMEDICAL RECOMMENDATIONS

The department recommends that pre-med students 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, download the Undergraduate Advising and Research publication at http://ual.stanford.edu/pdf/MedSchool.pdf.

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, 134, 136, 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, 134, 136, 151, 171, 173, 176, 181, 183, 184, 185; BIO 41, 42; MATH 41, 42, 51, 53, or CME 100, 102, 104; PHYSICS 41, 43; an approved, elective, graduate-level class related to the student's biochemical interests.

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 134. Analytical Chemistry Laboratory			5
CHEM 136. Synthesis Laboratory		3	
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 nonscience 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 31 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 the 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 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; and PHYSICS 21, 23, 25, or 28, 29, or 41, 43, 45 (no substitutions). Courses must be taken for a letter grade.

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 had 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.

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, or 297.

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.

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.

CLASSICS

Emeriti: (Professors) Mark W. Edwards, Marsh H. McCall, Jr.,* Susan Treggiari, Michael Wigodsky; (*Professor, Teaching*) Edward Spofford
Chair: Walter Scheidel
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), Josiah Ober (Classics, Political Science), M. Rush Rehm (Classics, Drama), Richard Saller (Classics, History), Walter Scheidel, Michael Shanks, Susan A. Stephens
Associate Professors: Jody Maxmin (Art and Art History, Classics), Anastasia-Erasmia Peponi, Jennifer Trimble
Assistant Professors: Giovanna Ceserani, Christian Kaesser, Grant Parker
Courtesy Professors: Ian Hodder, Chris Bobonich, Eva Prionas
Lecturers: Barbara Clayton, Maud Gleason, Norbert Lain, Fred Porta, Will Shearin

* Recalled to active duty.

Department Offices: Building 110, Main Quad
Mail Code: 94305-2145
Phone: (650) 723-0479
Web Site: http://classics.stanford.edu

Courses offered by the Department of Classics have the subject codes CLASSART, CLASSGEN, CLASSGRK, CLASSHIS, and CLASSLAT. Courses in Classics Art /Archaeology are listed in the "Classics Art/Archaeology (CLASSART) Courses" section of this bulletin. Courses in Classics General are listed in the "Classics General (CLASSGEN) Courses" section of this bulletin. Courses in Classics Greek are listed in the "Classics Greek (CLASSGRK) Courses" section of this bulletin. Courses in Classics History are listed in the "Classics History (CLASSHIS) Courses" section of this bulletin. Courses in Classics Latin are listed in the "Classics Latin (CLASSLAT) Courses" section of this bulletin.

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; and 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 Roman studies present cultural parallels 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.

UNDERGRADUATE PROGRAMS IN CLASSICS

The department offers the following fields of study for degrees in Classics: Classical Studies; Ancient History; Greek; Latin; and 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; History; and Literature and Philosophy.

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 8 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 or as early as possible in 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.

The B.A. degree may be earned by fulfilling the requirements for one of the following fields of study or fields of study with a focus:

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, 6, 7, and 8. 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
   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. at least five courses with the prefix CLASSART, CLASSGEN, or CLASSHIS (also IHUM 31, 39). 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.
2. *Classical Studies with a Philosophy and Literature Focus:* Students should declare the Classical Studies field of study on Axess, and meet with the undergraduate director concerning the Philosophy and Literature focus, and to discuss options for pursuing a period of study in the Mediterranean region. See http://philit.stanford.edu/programs.html. Courses counted for the degree must be taken for a letter grade. Students must complete at least 65 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar (WIM)
   b. at least five courses with the prefix CLASSART, CLASSGEN, or CLASSHIS (also IHUM 31, 39). 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.
   c. 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
   d. Writing in the Major (WIM) in the Philosophy department (one introductory Philosophy course)
   e. 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)
   f. PHIL 81. Philosophy and Literature
   g. 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.

h. Philosophy and Literature capstone seminar. This year's capstone seminars are ENGLISH 184L, Confessions: Writing and Reading the Self; PHIL 173A, Aesthetics: Metaphor across the Arts; ENGLISH 152D/PHIL 194L, W.E.B. DuBois as Writer and Philosopher; and HUMNTIES 197F/SLAVGEN 190/290, Tolstoy's *Anna Karenina* and the Social Thought of its Time. One of these courses must be taken in the student's senior year.

3. *Ancient History:* 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. 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 three survey courses in ancient history
   c. *depth requirement:* majors must take at least 32 units of ancient history and civilization courses, drawn from courses with CLASSHIS and CLASSGEN prefixes (also IHUM 39). IHUM 31, A,B, The Ancient Empires, may be counted toward this or the core requirement. 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.
   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. 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; ARTHIST 120A, 200, 200C; CASA 1/201, 90, 301
      2. comparative ancient civilizations: majors must take a course on the ancient world outside the Mediterranean and western Asia, such as ANTHSCI 3, 7, 103, 141; HISTORY 192
      3. historical and social theory: for example, CASA 1/201, 90; HISTORY 107, 206; SOC 1, 110, 113, 140, 142, 170
4. *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 31, 39). 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)
   e. it is recommended that students take a course in ancient history
5. *Greek with a Philosophy and Literature Focus*: Students should declare the Greek field of study on Axess, and meet with the undergraduate director concerning the Philosophy and Literature focus, and to discuss options for pursuing a period of study in the Mediterranean region. See http://philit.stanford.edu/programs. Courses counted for the degree must be taken for a letter grade. Students must complete at least 65 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar
   b. at least three courses with the prefix CLASSART, CLASSGEN, or CLASSHIS, (also IHUM 31, 39). 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.
   c. 31 units in Greek courses at the 100 level or higher
   d. Writing in the Major (WIM) in the Philosophy Department (one introductory Philosophy course)
   e. 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)
   f. PHIL 81. Philosophy and Literature
   g. 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.
   h. Philosophy and Literature capstone seminar; this year's capstone seminars are ENGLISH 184L, Confessions: Writing and Reading the Self; PHIL 173A, Aesthetics: Metaphor across the Arts; ENGLISH 152D/PHIL 194L, W.E.B. DuBois as Writer and Philosopher; and HUMNTIES 197F/SLAVGEN 190/290, Tolstoy's *Anna Karenina* and the Social Thought of its Time. One of these courses must be taken in the student's senior year.
6. *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)
   e. it is recommended that students take a course in ancient history
7. *Latin with a Philosophy and Literature Focus:* Students should declare the Latin field of study on Axess, and meet with the undergraduate director concerning the Philosophy and Literature focus, and to discuss options for pursuing a period of study in the Mediterranean region. See http://philit.stanford.edu/programs. Courses counted for the degree must be taken for a letter grade. Students must complete at least 65 units of approved courses including:
   a. CLASSGEN 176. Majors Seminar (WIM)

b. at least three courses with the prefix CLASSART, CLASSGEN, or CLASSHIS, (also IHUM 31, 39). 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.
c. 31 units in Latin courses at the 100 level or higher
d. Writing in the Major (WIM) in the Philosophy Department (one introductory Philosophy course)
e. 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)
f. PHIL 81. Philosophy and Literature
g. 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.
h. Philosophy and Literature capstone seminar. This year's capstone seminars are ENGLISH 184L, Confessions: Writing and Reading the Self; PHIL 173A, Aesthetics: Metaphor across the Arts; ENGLISH 152D/PHIL 194L, W.E.B. DuBois as Writer and Philosopher; and HUMNTIES 197F/SLAVGEN 190/290 Tolstoy's *Anna Karenina* and the Social Thought of its Time. One of these courses must be taken in the student's senior year.

8. *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.

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 3.3 in Classics courses 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 junior year, and a final version is due at the beginning of 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 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 one or two quarters of the senior year for a maximum of 6 units a 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.

HUMANITIES

The honors program in Humanities is available for Classics majors with appropriate interests; see the "Interdisciplinary Studies in Humanities" section of this bulletin.

DIGITAL HUMANITIES MODULE

The Classics Department, in collaboration with the Humanities Lab, also offers a digital humanities module that can be combined with any of the department's major programs. Students who are interested in digital humanities should contact the department's undergraduate director who facilitates coordination with the Humanities Lab. Students planning to combine a Classics major and the digital humanities module must fulfill the following requirements in addition to the general Classics major requirements:

1. CS 105 or equivalent
2. Participate in the Humanities Lab gateway core seminar, HUMNTIES 198J/ENGLISH 153H, Digital Humanities: Literature and Technology (5 units)
3. Complete the HUMNTIES 201, Digital Humanities Practicum (2-5 units), in the junior year
4. Complete one digital project, in lieu of the course's main writing requirement, in a course offered in the department under the supervision of the course instructor and humanities lab adviser. This should usually be done in an upper-division course.

Students are encouraged to enroll in DLCL 99, Multimedia Course Lab, when working on the digital course project. For more information on the Digital Humanities Lab, see http://shl.stanford.edu.

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. 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 (http://studyabroad.duke.edu/iccs/index.php) in Rome which is managed by Duke University for about 50 constituent colleges and universities. 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 two years of Latin before they arrive in Rome. Brochures are available at the department office. ICCS now offers a program in Sicily, http://studyabroad.duke.edu/sicily/index.php
   Other programs offer a quarter, semester, or summer session in Rome. Interested students should visit Bechtel International Center.
2. *Greece:* students are encouraged to apply for the summer session at the American School of Classical Studies in Athens (http://www.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://www.cyathens.org) offer a quarter, semester, or summer session in Greece. Interested students should visit Bechtel International Center.

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. Courses offered in Greek and Latin above the 100 level may count toward the minor, provided the subject matter is suitable. Students

who minor in Classics are required to take CLASSGEN 176, Majors Seminar, which is writing intensive.

Students may choose among three minors in Classics:

1. *Classical Languages*: students are required to take a minimum of five courses in Greek or in Latin. 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. 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. *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 the 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.

GRADUATE PROGRAMS IN CLASSICS

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.

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.
   This includes:
   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://www.stanford.edu/dept/classics. 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 fourth year.
   These must include:
   a. at least three graduate (200) 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. This includes:
   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.
   d. 10 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,B,C or CLASSGEN 208 A,B,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,B,C and 208A,B,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. This includes:
   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 IN HUMANITIES

The Department of Classics participates in the Graduate Program in Humanities leading to the Ph.D. degree in Classics and Humanities. For a description of that program see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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.

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: Jeremy Bailenson
Director, Undergraduate Studies: Fred Turner
Deputy Director, John S. Knight Fellowships for Professional Journalists: Dawn E. Garcia
Acting Director, Journalism: Ann Grimes
Professors: James S. Fishkin, Theodore L. Glasser, Shanto Iyengar, Jon Krosnick, Clifford Nass, Byron B. Reeves
Assistant Professors: Jeremy Bailenson, Fred Turner
Courtesy Professors: Jan Krawitz, Lawrence Lessig, Walter W. Powell, Kristine M. Samuelson
Visiting Lorry I. Lokey Professorship in Professional Journalism: Joel Brinkley, Glenn Frankel
Visiting Hearst Professional in Residence: Ann Grimes
McClatchy Visiting Associate Professor: Beth Noveck
Visiting Associate Professor: Robert Luskin
Lecturers: John Markoff, Gary Pomerantz, Howard Rheingold, James Wheaton, Gregg Zachary

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Courses offered by the Department of Communication have the subject code COMM, and are listed in the "Communication (COMM) Courses" section of this bulletin.

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 for an academic year. The John S. and James L. Knight Foundation sponsors twelve U.S. journalists. They are joined by nine International Fellows sponsored by the Lyle and Corrine Nelson International Fellowship Fund, the Knight Foundation, Yahoo Inc., and others.

ADMISSION

Prospective Undergraduates—Write to the University's Office of Undergraduate Admissions, Stanford University, Stanford, California 94305-3020.

Prospective Coterminal Students—Applications are available online at http://registrar.stanford.edu/shared/publications.htm#Coterm.

Prospective Graduate Students—Online applications are preferred and can be submitted on the web 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.

UNDERGRADUATE PROGRAMS 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 or COMM 1B
COMM 106
COMM 108

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.

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. A minimum of two courses must be taken from COMM 126, 160, 162, 166, 168, 169, 170, 172.

Area II: Communication Systems/Institutions—Area II considers the roles and interaction of institutions such as broadcasting, journalism, constitutional law, and business within communication and mass communication contexts. A minimum of two courses must be taken from COMM 104, 116, 117, 120, 125, 131, 136, 140, 147, 182.

Options—The Communication curriculum is designed to provide a theoretical base that can be effectively applied to numerous environments. The potential options listed below are not required, but are examples of how to focus interests.

1. *Communication Technologies*—
   a. Department of Communication (COMM):
   COMM 120. Digital Media in Society
   COMM 166. Virtual People
   COMM 169. Computers and Interfaces: Psychology and Design
   COMM 172. Media Psychology
   b. Affiliated department offerings (elective credit toward the major):
   CS 105. Introduction to Computers
   CS 106A. Programming Methodology
   CS 147. Introduction to HCI
   CS 201. Computers, Ethics, and Social Responsibility
   CS 247. Human Computer Interaction: Interaction Design Studio
   STS 101. Science, Technology, and Contemporary Society
2. *Communication and Public Affairs*—
   a. Department of Communication (COMM)
   COMM 125. Perspectives on American Journalism
   COMM 136. Democracy and the Communication of Consent
   COMM 160. The Press and the Political Process
   COMM 162. Analysis of Political Campaigns
   COMM 170. Communication and Children
   b. Affiliated department offerings (elective credit toward the major)
   POLISCI 123. Politics and Public Policy
   PSYCH 75. Cultural Psychology
   PSYCH 167. Seminar on Aggression
   PSYCH 180. Social Psychology Perspectives on Stereotyping and Prejudice
   PUBLPOL 104. Economic Policy Analysis
   PUBLPOL 194. Technology Policy
3. *Media Practices and Performance*—
   a. Department of Communication (COMM)
   COMM 120. Digital Media in Society
   COMM 125. Perspectives on American Journalism
   COMM 131. Media Ethics and Responsibility
   COMM 160. The Press and the Political Process
   b. Affiliated department offerings (elective credit toward the major)
   AFRICAST 148. Media, Art and Social Changes in Africa

The remainder of the 60 required units may be fulfilled with any elective Communication courses, or crosslisted 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. Students who fail to submit a satisfactory draft Autumn Quarter will be dropped from the program.

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 and it 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 or COMM 1B
COMM 106
COMM 108

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 (formerly COMM 1), 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 crosslisted 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 the Time Schedule for details.

Core courses are usually offered only once annually, and they constitute a sequence:

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 126, 160, 162, 166, 168, 169, 170, 172

Area II: Communication Systems/Institutions—a minimum of one course from COMM 104, 116, 117, 120, 125, 131, 136, 140, 147, 182

Elective courses—totaling 10 units.

GRADUATE PROGRAMS IN COMMUNICATION

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.

MEDIA STUDIES COTERMINAL MASTER'S PROGRAM

The Department of Communication offers current Stanford University undergraduates a coterminal program with an M.A. emphasis in Media Studies specializing in either social sciences or journalism. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 may be submitted no later than November 18, 2008 for admission beginning in either Winter or Spring Quarter 2008-09 or Autumn Quarter 2009-10. Journalism track students may begin the program only in Spring Quarter of their senior year. There is no rolling admission in the Communication department. 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) 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. This one-year program is designed for current Stanford University undergraduates. 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. 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 226. Advanced Topics in Human Virtual Representation
   COMM 231. Media Ethics and Responsibility
   COMM 236. Democracy and the Communication of Consent
   COMM 238. Democratic Theory
   COMM 240. Digital Media Entrepreneurship
   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 270. Communication and Children
   COMM 272. Media Psychology
   COMM 277. Specialized Writing and Reporting
   COMM 314. Doctoral Research Methods IIB*
   COMM 318. Doctoral Research Methods II*

* These courses are designed for Ph.D. students. Master's students require consent of faculty.

1. *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 of Journalism. Applicants for this program, and for doctoral work, 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 application that may be downloaded at http://registrar.stanford.edu/shared/publications.htm#GradStud. 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 220. Digital Media in Society
COMM 225. Perspectives on American Journalism
COMM 240. Digital Media Entrepreneurship
COMM 273,274. Public Issues Reporting I,II
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 seven or eight, and three 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 49 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, 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, computer programming, a foreign language, 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. The requirements and procedures for applying for candidacy 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.
8. Complete a dissertation satisfactory to a reading committee of three or more faculty members in the Department of Communication and one faculty member not in 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.

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
Chair: Russell Berman
Director of Graduate Admissions: David Palumbo-Liu
Director of Graduate Studies: Hans Ulrich Gumbrecht
Director of Undergraduate Studies: Margaret Cohen
Professors: John Bender (English, Comparative Literature), 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, Spanish and Portuguese, Comparative Literature), Seth Lerer (English, Comparative Literature, Autumn only), Franco Moretti (English, Comparative Literature), Elisabeth Mudimbe-Boyi (French and Italian, Comparative Literature, on leave Autumn), Andrea Nightingale (Classics, Comparative Literature, on leave), David Palumbo-Liu (Comparative Literature), Patricia Parker (English, Comparative Literature), Ramón Saldívar (English, Comparative Literature, on leave), Jeffrey T. Schnapp (French and Italian, Comparative Literature), Ban Wang (Asian Languages, Comparative Literature)
Associate Professor: Monika Greenleaf (Slavic Languages and Literatures, Comparative Literature)
Courtesy Professors: John Wang
Lecturers: Marie-Therese Ellis, Shafiq Shamel
Consulting Professor: Hayden White
Visiting Professors: Richard Davis (Comparative Literature, Autumn), Astrid Fellner (Comparative Literature, Winter, Spring), Herbert Lachmayer (Comparative Literature, Spring)

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Courses offered by the Department of Comparative Literature have the subject code COMPLIT, and are listed in the "Comparative Literature (COMPLIT) Courses" section of this bulletin.

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.

UNDERGRADUATE PROGRAMS IN COMPARATIVE LITERATURE

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.

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 adviser, 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 Director 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 Director of Undergraduate Studies at least once a year. The director 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 Director 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 department administrator. The honors college is coordinated by the Division of Literatures, Cultures, and Languages (DLCL).

BACHELOR OF ARTS IN COMPARATIVE LITERATURE

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 for 2008-09.
2. *The genre core:* COMPLIT 121, Poems, Poetry, Worlds: An Introductory Course; COMPLIT 122, Literature as Performance; 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 Director of Undergraduate Studies of Comparative Literature, and the Director 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. Five courses using materials in the original language and making up an intellectually coherent program in the literature of a language other than the student's native tongue. Bilingual students may satisfy this requirement in either of their original languages or in a third language. The coherence of this program must be approved in writing by the Director of Undergraduate Studies of Comparative Literature.
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 Director of Undergraduate Studies of Comparative Literature and by the Director 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:* students 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 Director 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.

DIGITAL HUMANITIES MODULE

The Comparative Literature department offers a digital humanities module that can be combined with any of the department's major programs. Students who are interested in digital humanities should contact the department's Director of Undergraduate Studies. Students planning to combine the Comparative Literature major and the digital humanities module must fulfill the following requirements in addition to the general major requirements:

1. CS 105 or equivalent
2. Participate in the Humanities Lab gateway core seminar, HUMNTIES 198J/ENGLISH 153H, Digital Humanities: Literature and Technology (5 units)
3. Complete the HUMNTIES 201, Digital Humanities Practicum (2-5 units), in the junior year
4. Complete one digital project, in lieu of the course's main writing requirement, in a course offered in the department under the

supervision of the course instructor and humanities lab adviser. This should usually be done in an upper-division course.

Students are encouraged to enroll in DLCL 99, Multimedia Course Lab, when working on the digital course project.

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 Director 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 Director of Undergraduate Studies and the chair of the department.

The Director 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 Director 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.

GRADUATE PROGRAMS IN COMPARATIVE LITERATURE

The department offers a Doctor of Philosophy in Comparative Literature.

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. 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. Completed applications are due December 4. 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 what they think will be their primary field, including the literatures on which they intend to concentrate.

All applicants should arrange to have the results of the general section of the Graduate Record Examination sent to the Department of Comparative Literature.

Recommendations should, if possible, come from faculty in at least two of the literatures in which the student proposes to work.

Applicants must submit a copy of an undergraduate term paper which they consider representative of their best work.

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, of which at least 72 units must be within the department. 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.

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 administered toward the close of the Spring Quarter 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 Director 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 in Spring Quarter would have the opportunity to retake the exam the following Autumn Quarter. Students who do not pass the exam a second time may merit department action or review.
2. *Second One-Hour Examination*: The theory exam is administered toward the close of the Spring Quarter 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 Director of Graduate Studies well in advance of the exam. Any student who does not pass the exam may merit department action or review.
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 Director 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. At this time, the student is also recommended for the Master of Arts degree in Comparative Literature if 45 units of work at Stanford have been completed and the student has not already completed an M.A. before entering the program.

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. 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: Jeanne Tsai
Curriculum Committee: Gordon Chang, Michele Elam, Charlotte Fonrobert, Teresa LaFromboise, Tania Mitchell, Cheryl Richardson, Gary Segura, Vered Shemtov
Affiliated Faculty and Teaching Staff: 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), Martin Carnoy (Education), Clayborne Carson (History), Prudence Carter (Education), Gordon Chang (History), Karen Cook (Sociology), Michele Dauber (Law), Linda Darling-Hammond (Education), 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), Gabriel Garcia (Medicine), 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), Matthew Kohrman (Anthropology), Jan Krawitz (Art and Art History), Jon Krosnick (Communication), Teresa LaFromboise (Education), David Laitin (Political Science), Liisa Malkki (Anthropology), Sandra Lee (Asian American Studies), Hazel Markus (Psychology), Barbaro Martinez-Ruiz (Art and Art History), Douglas McAdam (Sociology), Monica McDermott (Sociology), Tania Mitchell (Comparative Studies in Race and Ethnicity), James Montoya (Comparative Studies in Race and Ethnicity), Cherríe Moraga (Drama), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Italian), Thomas S. Mullaney (History), Stephen Murphy-Shigematsu (Asian American Studies), Na'ilah Nasir (Education), Sharon Nelson-Barber (Native American Studies), Hilton Obenzinger (Undergraduate Advising and Research), Susan Olzak (Sociology), Amado Padilla (Education), David Palumbo-Liu (Comparative Literature), Gabriele Pisarz-Ramirez (Chicana/o Studies), Gina Marie Pitti (Chicana/o Studies), Arnold Rampersad (English), Robert Reich (Political Science), John Rickford (Linguistics), Cheryl Richardson (African and African American Studies), Cecilia Ridgeway (Sociology), Richard Roberts (History), Aron Rodrigue (History), Michael Rosenfeld (Sociology), Ramón Saldívar (English), Joel Samoff (Center for African Studies), Stephen Sano (Music), Debra Satz (Philosophy), Gary Segura (Political Science), Vered Shemtov (Division of Language and Literature), JoEllen Shively (Native American Studies), C. Matthew Snipp (Sociology), Paul Sniderman (Political Science), Stephen Sohn (English), Jayashiri Srikantiah (Law), Claude Steele (Psychology), James Steyer (Comparative Studies in Race and Ethnicity), Ewart Thomas (Psychology), Jeanne Tsai (Psychology), Linda Uyechi (Music), Guadalupe Valdés (Education; Spanish and Portuguese), 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 (Spanish and Portuguese), Bob Zajonc (Psychology, emeritus), Steven Zipperstein (History)
Teaching Fellows: Matthew Daube, Doris Madrigal, Rand Quinn
Program Office: Building 360, Room 361F
Mail Code: 2152
Phone: (650) 723-8449
Email: mibarra@stanford.edu
Web Site: http://ccsre.stanford.edu

Courses offered by the Program in Comparative Studies in Race and Ethnicity have the subject code CSRE, and are listed in the "Comparative Studies in Race and Ethnicity (CSRE) Courses" section of this bulletin.

UNDERGRADUATE PROGRAMS IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

MAJORS

CORE CURRICULUM

The Interdisciplinary 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, Comparative Studies, Chicana/o Studies, and Native American Studies) are offered as part of CSRE. All courses taken for the major must be taken for a letter grade. In addition, majors in the Program in African and African American Studies enroll in the core curriculum offered by CSRE. The directors of the programs and of each major constitute the CSRE curriculum committee, the policy making body for the interdisciplinary program.

Students who declare any of the five majors participate in a common curriculum of the CSRE consisting of at least two introductory core courses and a senior seminar. Individually designed majors in Jewish Studies may also enroll in the CSRE core curriculum.

There are two types of introductory, interdisciplinary core courses taught by senior CSRE-affiliated faculty: regular core courses that compare across racial and ethnic groups; and single-group core courses that focus on a specific racial or ethnic group.

MINORS

Students who wish to minor in the study areas must complete six courses (a minimum of 30 units) from the approved CSRE course list, two of which must be introductory 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 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

SENIOR SEMINAR

Research and the 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.

RELATED PROGRAMS

CSRE-related majors have several unique opportunities available to them. The program supports full-time paid summer internships for those who apply to work in a non-profit or government agency in a public policy-related area. The CSRE Public Policy/Leadership Institute is a two week, pre-Autumn Quarter seminar that provides exposure to critical public policy issues and is taught by a leading faculty member. The residence-based institute provides room and board and all seminar materials for participants, including a visit to Sacramento to meet with policy makers. The CSRE program also sponsors quarterly career workshops and informal luncheons for all majors and minors.

HONORS

Majors in each of the study areas who meet academic qualifications (at least a grade point average of 3.5 in CSRE-related courses) may apply for honors. Majors are expected to participate in a Winter Quarter junior workshop in preparation for honors thesis research. Prizes for best undergraduate honors theses are awarded annually by the CSRE curriculum committee.

Courses that fulfill honors requirements.
CSRE 199. Pre-Honors Seminar (1 unit)
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: Michele Elam

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: Gordon Chang

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.

REQUIREMENTS

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 single-group, core course that focuses on a non-Asian ethnic group may be counted toward the 15-unit core requirement.

Majors are required to take one foundational thematic course in Asian American Studies. This may be either HISTORY 59, Introduction to Asian American History, or COMPLIT 148, Introduction to Asian American Cultures. 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. Students may obtain credit for their study of a related Asian language towards their degree. A total of 60 units of course work is required for the major.

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. A total of 30 units of approved course work is required for the minor.

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)
COMPLIT 142/ENGLISH 172E. Literature of the Americas (5 units)
COMPLIT 148. Introduction to Asian American Cultures (5 units)
CSRE 179G//DRAMA 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
HISTORY 59. Introduction to Asian American History (not given this year)
POLISCI 137R/337R/EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)

Thematic Courses for Majors and Minors—
ASNAMST 173S/CSRE 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges (5 units)
ASNAMST 185A/ANTHRO 185A. Race and Biomedicine (5 units)

Cognate Courses—
COMPLIT 41Q. Ethnicity and Literature (3-5 units)
COMPLIT 148. Introduction to Asian American Cultures (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)
PSYCH 217. Topics and Methods Related to Culture and Emotion (1-3 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.

REQUIREMENTS

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 single-group, core course that focuses on a non-Mexican origin group may be counted toward the 15-unit core requirement.

Majors are required to take CHICANST 180E/SPANLIT 180E, Introduction to Chicana/o Studies. Majors complete an additional 40 units of courses relevant to the thematic concentration and approved by the adviser. A total of 60 units of course work are required for the major.

Students who wish to minor in Chicana/o Studies must complete two core introductory courses, including CHICANST 180E/SPANLIT 180E, Introduction to Chicana/o Studies, and one additional course from the approved list available from the CSRE undergraduate program office, and four additional courses related to the thematic concentration. A total of 30 units of approved course work is required for each minor.

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)
COMPLIT 142/ENGLISH 172E. Literature of the Americas (5 units)
CSRE 179G//DRAMA 179G/279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America (5 units)
CSRE 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
POLISCI 137R/EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
SPANLIT 180E. Introduction to Chicana/o Studies (not given this year)

Thematic Courses for Majors and Minors—
CHICANST 121R/CSRE 121R. Redefining the Nation: Chicana/o Literature and Art From the 1960s to the Present (5 units)
CHICANST 122/CSRE 122. Introduction to Latina Literature (5 units)
CHICANST 165A/CSRE 165A/HISTORY 264X. Chicana/o History (5 units)
CHICANST 189W/CSRE 189W. Language and Minority Rights (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—
DRAMA 17N. Salt of the Earth: The Docudrama in America (3 units)
DRAMA 179F. Flor y Canto: Poetry Workshop (3-5 units)
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)
POLISCI 327. Minority Behavior and Representation (5 units)
SOC 164. Immigration and the Changing United States (5 units)
SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society (5 units)
SPANLIT 193. The Cinema of Pedro Almodóvar (3-5 units)

COMPARATIVE STUDIES IN RACE AND ETHNICITY

Director: Jeanne Tsai

Comparative Studies in Race and Ethnicity, the largest of the five major/minors offered in the program, 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.

REQUIREMENTS

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 single-group, core course may be counted toward the 15-unit core requirement.

Comparative Studies majors complete another 45 units of course work relevant to the thematic concentration they have chosen in consultation with the adviser.

Students who wish to minor in Comparative Studies must complete six courses (a minimum of 30 units) from the approved course list.

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)
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 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)

Thematic Courses for Majors and Minors—
CSRE 12/ AFRICAAM 12. Presidential Politics: Race, Class, Faith, Gender in the 2008 Election (1-3 units)
CSRE 109A/NATIVEAM 109A. Federal Indian Law (5 units)
CSRE 116/NATIVEAM 116. Language, Culture, and Education in Native North America (5 units)
CSRE 117S/NATIVEAM 117S. History of California Indians (5 units)
CSRE 121R/CHICANST 121R. Redefining the Nation: Chicana/o Literature and Art from the 1906s to the Present (5 units)
CSRE 122/CHICANST 122. Introduction to Chicana/ Literature (5 units)
CSRE 145A/ANTHRO 145A. Poetics and Politics of Caribbean Women's Literature (5 units)
CSRE 173S/ASNAMST 173S. Transcultural and Multiethnic Lives: Contexts, Controversies and Challenges (5 units)
CSRE 189W/ CHICANST 189W. Language and Minority Rights (3-5 units)
CSRE 198. Internship for Public Service (1-5 units)
CSRE 199. Pre-Honors Seminar (1 unit)
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 101. African American Lecture Series: Race and Faith (1-3 units)
AFRICAAM 105/ENGLISH 143E/HISTORY 255B. Introduction to African and African American Studies (5 units)
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/ANTHRO 146A. Border Crossings and American Identities (5 units)
AMSTUD 184. Cityscapes of the Imaginary: The Urban World in Literature and Film (5 units)
ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America (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)
ANTHRO 185A. Race and Biomedicine (3-5 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 América (3 units)

DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts (5 units)
DRAMA 177. Playwriting (5 units)
DRAMA 179F. *Flor y Canto*: Poetry Workshop (3-5 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)
EDUC 261X/ETHICSOC 137R/POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
ENGLISH 43A/143A. American Indian Mythology, Legend, and Lore (3 units)
ENGLISH 140A. Creative Resistance and the Holocaust (5 units)
ENGLISH 143E/AFRICAAM 105/HISTORY 255B. Introduction to African and African American Studies (5 units)
ENGLISH 152D/AFRICAAM 152/PHIL 194L. W.E.B. DuBois 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)
ETHICSOC 137R/EDUC 261X/POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)
FEMST 101/HISTORY 107. Introduction to Feminist Studies (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 85S. Jews, Christians and Muslims in a Mediterranean Port City: Salonica, 1821-1945 (5 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 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 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 217. Topics and Methods Related to Culture and Emotion (1-3 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 138. American Indians in Comparative Historical Perspective (5 units)
SOC 139. American Indians in Contemporary Society (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 148. Racial Identity (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 166. Mexicans, Mexican Americans, and Chicanos in American Society (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.

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 selected 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.

REQUIREMENTS

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 single-group, core course that focuses on a non-Native American group may be counted toward the 15-unit core requirement.

Majors complete an additional 45 units of course work that satisfy three categories of their thematic concentration: Native American focus, comparative focus, and a methodology/research course. A total of 60 units of coursework are required for the major.

Students who wish to minor in Native American Studies must complete two core introductory courses and four additional courses related to the thematic concentration. A total of 30 units of approved course work is required for the minor.

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)
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 196C/ENGLISH 172D/PSYCH 155. Introduction to Race and Ethnicity (5 units)
CSRE 200X. CSRE Senior Seminar (WIM; 5 units)
EDUC 177. Education of Immigrant Students: Psychological Perspectives (4 units)
EDUC 245. Understanding Racial and Ethnic Identity Development (3-5 units)
POLISCI 137R/EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century (5 units)

Thematic courses for Majors and Minors—

NATIVEAM 18SI. Alaska Native Culture: Combating Stereotypes and the Anti-Native Sentiment for Centuries (2 units)
NATIVEAM 109A/CSRE 109A. Federal Indian Law (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)

Cognate Courses—

ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America (5 units)
EDUC 193N. Peer Counseling in the Native American Community (1 unit)
EDUC 233A. Adolescent Development and Mentoring in the Urban Context (3 units)
ENGLISH 43A/143A. American Indian Mythology, Legend, and Lore (3 units)
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)
SOC 138. American Indians in Comparative Historical Perspective (5 units)
SOC 139. American Indians in Contemporary 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, as well as the five CSRE major areas of study: 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)
DRAMA 17N. Salt of the Earth: The Docudrama in América (3 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)
DRAMA 177. Playwriting (5 units)
CSRE 201B/CHICANST 201B. From Racial Justice to Multicultarism: Movement-based Arts Organizing in the Post Civil Rights Era (5 units)

THEMATIC CONCENTRATION IN PUBLIC SERVICE

The Public Service thematic concentration is designed to ensure that CSRE students interested in public service have access to a structured curriculum providing a solid grounding in the theory and practice of public service that enables them to become future leaders in the sphere of public life. This concentration is not declared on Axess; it does not appear on the transcript or diploma. This thematic concentration can be completed within any of the majors within CSRE. Students should consult with the CCSRE undergraduate program director and the chair of African and African American Studies, Asian American Studies, Chicana/o Studies, or Native American Studies to ensure that the courses chosen for the Public Service thematic concentration also fulfill the requirements of the respective majors. Students who wish to pursue a thematic concentration in public service must organize their studies to include 15 credits of approved CSRE core courses, including CSRE 200X, CSRE Senior Seminar, in which students with a thematic concentration in public service may select a topic for their senior paper or honors thesis that reflects their interest in public or experience with a past internship.

In addition to the usual core requirements expected of all CCSRE majors, students who wish to pursue a thematic concentration in Public Service must take an additional 40 units organized around four subject matter areas: organization and leadership; inquiry and assessment; serving diverse communities; and service learning. They also must complete 5 units in a public service internship. Students interested in the Public Service thematic concentration should contact the CSRE Undergraduate Program Office for details about its requirements.

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 single-group core course may be counted toward the 15 unit core requirement.

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 137R/EDUC 261X. Justice at Home and Abroad: Civil Rights in the 21st Century (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., Peggy Phelan (Drama, English), Alice Rayner (Graduate Faculty Advisor, Graduate Studies Committee-Chairperson), Rush Rehm (Drama, Classics)
Assistant Professors: Branislav Jakovljevic (Undergraduate Faculty Advisor), Jisha Menon
Professor (Teaching): Michael F. Ramsaur
Associate Professor (Teaching): Janice Ross
Senior Lecturer: Connie Strayer
Lecturers: Jeffrey Bihr, Erik Flatmo Gambatese, Daniel Klein, Kathryn Kostopoulos, Leticia Samonte
Visiting Artists: Matthew Gouhlish, Lin Hixson
Guest Lecturer: Linda Apperson
Artists in Residence: Amy Freed, Cherríe Moraga
Institute for Diversity in the Arts and Black Performing Arts Division
Division Director: Harry J. Elam, Jr.
Associate Director (IDA): Georgina Hernandez
Director (CBPA): Robert Moses
Joint IDA/BPA Steering Committee: Suzanne Abel (Haas Center for Public Service), Jan Barker Alexander (Black Community Services Center), Elena Becks (Staff), Enrique Chagoya (Associate Professor, Studio Art), Regina Covington (King Papers), Alice Endamne (*Black Arts Quarterly*), Diane Frank (Lecturer, Dance), Vera Grant (African and African American Studies), Tony Kramer (Senior Lecturer, Dance), Barbaro Martinez-Ruiz (Associate Professor, Art History), Julia Melancon (Staff), Cindy Ng (Asian American Activities Center), Janice Ross (Professor, Teaching, Drama), Stephen Sano (Associate Professor, Teaching, Music), Laura Selznick (VPUE), Yvonne Yarbro-Bejarano (Professor, Chicana/o Studies), Patience Young (Cantor Arts Center)
Dance Division
Director: Janice Ross
Lecturers: Kristine Elliott, Diane Frank, Aleta Hayes, Tony Kramer, Augusta Moore, Richard Powers, Ronnie Reddick
Artist in Residence: Robert Moses

Mail Code: Drama, 94305-5010; Dance, 94305-8125
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 have the subject codes DRAMA and DANCE. Courses in Drama are listed in the "Drama (DRAMA) Courses" section of this bulletin. Courses in Dance are listed in the "Dance (DANCE) Courses" sections of this bulletin.

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 had 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 work of visiting artists.

UNDERGRADUATE PROGRAMS IN DRAMA

The mission of the Undergraduate program in Drama is to provide the strongest non-conservatory program for students studying Drama and Dance in a liberal arts context. Joining academic research with performance and technical practice, our 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 done 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 fully 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.

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.

1. *Introductory Core Courses*—16 units chosen from the following:
   DRAMA 30. Introduction to Theatrical Design
   DRAMA 34. Stage Management Techniques
   DRAMA 101H. How Theater Thinks
   DRAMA 101R. How Practice Practices (begins 2009-10)
2. *Literature/History*—16 units chosen from the following:
   DRAMA 35. Introduction to Sound for the Theater
   DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts
   DRAMA 120A. Acting Fundamentals
   DRAMA 120B. Fundamentals of Acting
   DRAMA 121P. Acting: Period and Style
   DRAMA 152. Beckett
   DRAMA 160. Performance, Dance, and History
   DRAMA 161R. Texts in History: Classics from Greece to Rome
   DRAMA 162. Performance in the Text
   DRAMA 170A. Concepts of Directing
   DRAMA 170B. Advanced Directing
   DRAMA 170P. Composing Performance
   DRAMA 175. Bay Area Performance Platform: SFMOMA Project
   DRAMA 176H. Dramaturgy Project: The Wasteland
   DRAMA 177. Playwriting
   DRAMA 178. Page to the Stage: Playwriting and Solo Performance
   DRAMA 179F. Flor y Canto: Poetry Workshop
   DRAMA 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
   DRAMA 201A,B,C,D. Honors Colloquium
   DRAMA 219. Contemporary African American Drama: August Wilson, Suzan-Lori Parks, and Beyond
3. *Practical Courses*—16 units chosen from the following:
   DANCE: Any course with the subject code DANCE
   DRAMA 20. Acting for Non-Majors
   DRAMA 29. Theater Performance: Acting
   DRAMA 32. Costume Construction
   DRAMA 28. Makeup for the Stage
   DRAMA 103. Beginning Improvising
   DRAMA 104. Introduction to Sketch Comedy
   DRAMA 120A. Acting Fundamentals
   DRAMA 120B. Fundamentals of Acting
   DRAMA 120D. Studio Performance
   DRAMA 120V. Vocal Production and Audition
   DRAMA 121C. Physical Characterization
   DRAMA 121M. Movement and Character
   DRAMA 121P. Acting: Period and Style
   DRAMA 121S. Acting Shakespeare Project
   DRAMA 131. Lighting Design
   DRAMA 132. Costume Design
   DRAMA 133. Stage Scenery Design
   DRAMA 135. Sound Design
   DRAMA 139. Stage Management Production Crew
   DRAMA 170A. Concepts of Directing
   DRAMA 170B. Advanced Directing
   DRAMA 170P. Composing Performance
   DRAMA 171. Undergraduate Theater Workshop
   DRAMA 176P. Wasteland Practical
   DRAMA 177. Playwriting
   DRAMA 213. Stanford Improv Ensemble
   DRAMA 231. Advanced Stage Lighting Design
   DRAMA 232. Advanced Costume Design
   DRAMA 233. Advanced Scene Design
   DRAMA 234. Advanced Stage Management Project
4. *Production*—12 units chosen from the following:
   DRAMA 134. Stage Management Project (required)

   Choose 2 courses (required):
   DRAMA 39A. Theater Performance: Scenery and/or Property
   DRAMA 39B. Theater Performance: Lighting/Sound
   DRAMA 39C. Theater Performance: Costumes/Makeup
   DRAMA 39D. Theater Performance: Prosser Stage Management

   Choose any course(s) for remaining units:
   DRAMA 9. Undergraduate Production Colloquium
   DRAMA 22. Scene Work
   DRAMA 29. Theater Performance: Acting
   DRAMA 31. Introduction to Lighting and Production
   DRAMA 32. Costume Construction
   DRAMA 35. Introduction to Sound for the Theater
   DRAMA 131. Lighting Design
   DRAMA 132. Costume Design
   DRAMA 133. Stage Scenery Design
   DRAMA 133C. Autocad for Designer
   DRAMA 139. Stage Management Production Crew
   DRAMA 231. Advanced Stage Lighting Design
   DRAMA 232. Advanced Costume Design
   DRAMA 233. Advanced Scene Design
   DRAMA 234. Advanced Stage Management Project
   DRAMA 235. Advanced Sound Design
5. *Optional Senior Project*—2 units
   DRAMA 200. Senior Project
   DRAMA 205. Senior Project: Acting

   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.

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. 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.
3. Students must have completed half of the courses in their specialization by the end of their junior year.
4. 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.
5. GPA in courses counting towards the major must be 3.5 by the time of graduation.

6. 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.
7. 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.
8. Failure to meet any of these requirements, or to make satisfactory progress on the honors thesis, leads to dismissal from the honors program.

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. Student 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 and carefully 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 WITH DANCE CONCENTRATION

Requirements—30 total units

1. Technique Classes: Studio Classes: Minimum of six studio dance classes (12 units)
   a. a concentration of at least three classes chosen from a specific dance form (e.g., world, modern, jazz, hip-hop, ballet, social), and the attainment of intermediate or advanced level. (6 Units)
   b. at least two classes in a style other than the concentration (4 units)
   c. one additional classes (2 units)
2. Dance Studies Classes: Minimum of three of the following (10-12 units)
   a. DANCE 160. Performance: Dance, and History (4 units)
   b. DANCE 170. Postmodern Road Trips (4 units)
   c. DANCE 197. Dance in Prisons (4 units)
   d. DANCE 191 or 290. Special Project (3-5 units)
3. Choreography/Repertory/Performance Classes (8 units)
   a. DANCE 57. Dance Repertory Projects (2 units)
   b. DANCE 100. Student Choreography (2 units)
   c. DANCE 101. Choreography: Solos & Duets (2 units)
   d. DANCE 102. Choreography: Small Groups (2 units)
   e. DANCE 104. Duets Project (2 units)
   f. DANCE 105. Contemporary Afro Styles (2 units)
   g. DRAMA 154P. The California Project (2 units)

GRADUATE PROGRAMS IN DRAMA

The mission of the graduate program in Drama is to produce students who work in 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 rigorous study of critical theory and textual history and an understanding that such theory is informed by practical elements in directing, acting, writing, and design.

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

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: 300A, 300B, 301, 302, 303, 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: 370, Concepts of Directing; 372, Projects in Directing; and 373, Directing and Dramaturgy. In the second year, students take 374, Graduate Directors' Performance Project, to stage a more fully developed production chosen in consultation with the faculty.

The following department requirements are in addition to the University's basic requirements for the doctorate.

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. *Teaching Requirement*—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. During non-teaching quarters in years four and five, students serve as research assistants.
4. *Examinations*—Candidates must complete three examinations (comprehensive, qualifying, department oral) by the end of the first three years of study at Stanford.
   a. 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. 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 written in consultation with a faculty adviser. These essays should demonstrate mastery of the field such that a student would be able to teach an introductory class in the area. Reading lists for each period should be approved by the end of the first year. Each essay should cover a different period of dramatic literature and theater history. These essays should not duplicate any written work from seminars. After approval by the adviser, the graduate studies committee reads and evaluates these essays, one in each of Autumn, Winter, and Spring quarters. For the first qualifying examination, choose from the following periods of Western drama:
Classical
Medieval and Renaissance
17th, 18th, and early 19th century
Modern: 1870-1980
Contemporary: 1980 to the present

c. The department oral examination requires three faculty members, at least two from the Department of Drama. This oral is based on a 40-page review of the literature for the dissertation that the student creates in conjunction with the dissertation reading committee. This exam is ideally taken before the end of the third year.

5. *Satisfactory Progress, Annual Review*—The program and progress of each student must be evaluated by the Graduate Studies Committee (GSC) at the end of each academic year. At the end of the first year, the departmental 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. Any student not making satisfactory progress is subject to having funding suspended.
6. *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: 300A, 300B, 301, 302, 303, 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. at least two examinations.

   Based on its evaluation of the student's progress, the Graduate Studies Committee (GSC) 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.
7. *Research Assistantship*—Generally, the third year is devoted to graduate study and research assistantships with faculty members.
8. *Dissertation Prospectus*—The dissertation prospectus must be approved by the candidate's adviser and by the departmental graduate studies committee by the end of Spring Quarter of the third year. Within 30 days of approval, a student should schedule a prospectus colloquium with the proposed reading committee.
9. *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.
10. *Dissertation*—Normally, the Ph.D. program 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. Following formal admission to candidacy (typically at the end of the second year), the dissertation must be completed and approved within five years from the quarter in which candidacy is granted. A candidate taking more than five years is required to reinstate candidacy by repassing the written examinations on dramatic literature.

PH.D. IN DRAMA AND HUMANITIES

The Department of Drama participates in the Graduate Program in Humanities (GPH) leading to a Ph.D. degree in Drama and Humanities. For a description of that program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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, symposia, and a literary journal, the *Black Arts Quarterly*. 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, arts administration, and teaching. Students can pursue an IDA concentration through the Comparative Studies in Race and Ethnicity major. Students can emphasize Black performance through the African and African American Studies major.

DANCE DIVISION

The Dance Division offers approaches to dance as a performing art, cultural practice, political act, and embodiment of ideology and beliefs. All dimensions through which a student might experience dance, including studying dance techniques, choreographing, performing, viewing, and critically and historically assessing dance, are represented in the course offerings of the Dance Division.

MINOR

For students wishing to minor in Drama with a concentration in Dance, see the "Minor in Drama with Dance Concentration" section under "Undergraduate Programs in Drama."Minor in Drama with Dance Concentration

EAST ASIAN STUDIES

Director: Chaofen Sun
Affiliated Faculty and Staff:
Anthropological Sciences: Arthur P. Wolf
Anthropology: Harumi Befu (emeritus), Melissa Brown, Miyako Inoue, Matthew Kohrman
Art and Art History: Jean Ma, Melinda Takeuchi, Richard Vinograd
Asian Languages: Fumiko Arao, Kazuko M. Busbin, Steven Carter (on leave), Yin Chuang, Marina Chung, Robert Clark, Richard Dasher, Sik Lee Dennig, Michelle DiBello, Albert E. Dien (emeritus), Momoe Saito Fu, Hee-sun Kim, Indra Levy (on leave), Mark E. Lewis (on leave), Haiyan Lee, Nina Lin, Hisayo O. Lipton, Momoyo Kubo Lowdermilk, Yoshiko Matsumoto, Kiyomi Nakamura, James Reichert, Yu-hwa Liao Rozelle, Stuart Sargent, Chaofen Sun, Melinda Takeuchi, Yoshiko Tomiyama, Ban Wang, Huazhi Wang, John C. Y. Wang, Hong Zeng, Youping Zhang, Yiqun Zhou, Qi Zhu
Business: Hau Lee, Bruce McKern, Kenneth Singleton
Comparative Literature: David Palumbo-Liu

East Asian Studies: Karen Eggleston, Alisa Jones, Hak-joon Kim, John Osburg, Scott Rozelle, Adam Smith, Hui Wang
Economics: Masahiko Aoki (emeritus), Ronald McKinnon
Education: Jennifer Adams
Electrical Engineering: Richard Dasher
History: Gordon Chang, Peter Duus (emeritus), Harold L. Kahn (emeritus), Mark E. Lewis (on leave), Mark Mancall, Yumi Moon, Thomas Mullaney, Hwa Ji Shin, Matthew Sommer, Jun Uchida, Kären Wigen
Law: Eric Feldman, Mei Gechlik
Political Science: John W. Lewis (emeritus), Phillip Lipscy, Alice Lyman Miller, Daniel Okimoto (emeritus), Jean C. Oi
Religious Studies: Carl Bielefeldt, Paul Harrison, Lee H. Yearley
Sociology: Gi-Wook Shin (on leave), Andrew Walder, Xueguang Zhou

Center Offices: 100 Encina Commons
Mail Code: 94305-6023
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 belongs to the Division of International Comparative and Area Studies in the School of Humanities and Sciences.

Courses offered by the Center for East Asian Studies have the subject code EASTASN, and are listed in the "East Asian Studies (EASTASN) Courses" section of this bulletin.

East Asian Languages—For courses in Chinese, Japanese, and Korean language instruction with the subject codes CHINLANG, JAPANLNG, and KORLANG, see the "Language Center" section of this bulletin. For courses in Classical Chinese with the subject code CHINLIT, see the "Asian Languages" section of this bulletin.

The courses listed in the "East Asian Studies" section of this bulletin deal primarily with China, Japan, and/or Korea. Literature courses are listed separately under the "Asian Languages" section of this bulletin. 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 may be found under the department listings in this bulletin.

UNDERGRADUATE PROGRAMS IN EAST ASIAN STUDIES

DISTINGUISHED PRACTITIONERS

Eminent professionals whose work in East Asia brings real-life knowledge to the classroom serve as visiting lecturers through the CEAS Distinguished Practitioners from East Asia program. Teaching this year are Hak-joon Kim, "Politics of Divided Korea," and Hui Wang, "Ideas, History, and Culture in Modern China."

ACADEMIC THEME HOUSE

The East Asian Studies Theme House, or EAST House, is an undergraduate residence that houses 60 students and offers them opportunities to expand their knowledge, understanding, and appreciation of Asia. EAST House is located on campus at Governor's Corner. Assignment is made through the regular undergraduate housing draw.

BACHELOR OF ARTS IN EAST ASIAN STUDIES

The undergraduate major in East Asian Studies enables students to obtain a comprehensive understanding of East Asia broadly conceived, which is the vast area stretching from Japan through Korea and China to the contiguous areas of the Central Asian land mass. 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 for approval by the East Asian Studies undergraduate committee.

Majors must complete at least 75 units of course work on China, Japan, and/or Korea. 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. *Gateway Courses:* a minimum of three gateway courses, one in each area. The gateway courses are:
   a. Art, Literature and Religion
   CHINGEN 91. Traditional East Asian Civilization: China
   JAPANGEN 92. Traditional East Asian Civilization: Japan
   RELIGST 14. Introduction to Buddhism
   RELIGST 18. Introduction to Zen Buddhism
   b. History
   HISTORY 194B. Japan in the Age of the Samurai
   HISTORY 198. The History of Modern China
   HISTORY 193. Late Imperial China
   HISTORY 195. Modern Korean History
   HISTORY 256. U.S.-China Relations: From the Opium War to Tiananmen
   c. Contemporary Social Sciences
   EASTASN 185C. Economic Development of Greater China
   HUMBIO 147. Population and Environment in China
   POLISCI 140L. China in World Politics
   POLISCI 117. Political Economy of East Asia
   SOC 117A. China Under Mao
3. *Substantive Concentration:* additional courses on East Asia, one of which must be a seminar.
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. EASTASN 198, Senior Colloquium (1 unit), is required of majors.
5. At least one quarter overseas in the country of focus.

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 such as:
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

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, JAPANGEN 138, and HISTORY 256 satisfy the WIM requirement.

The courses for the major must add up to at least 75 units and all must be taken for a letter grade.

HONORS PROGRAM

Majors with a grade point average (GPA) of 3.25 or better in all courses related to East Asia may apply for the honors program no later than the final quarter of the junior year. Application entails submitting an honors prospectus to the student's adviser for approval. Admission is granted by the CEAS undergraduate committee, acting on the adviser's recommendation.

Honors requirements are satisfactory completion of:

1. An honors thesis of high quality of approximately 10,000 words to be submitted in lieu of the senior capstone essay.

2. 5 to 10 units of directed individual study in connection with the thesis project.
3. One advanced level colloquium or seminar dealing with China, Japan, or Korea.

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 gateway courses, one in each area (see above for listing of gateway courses).
2. One undergraduate seminar and two other courses from among those listed each quarter as approved for East Asian Studies majors, including literature courses but excluding language courses.

Applications for the minor are due no later than the second quarter of the junior year.

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 must be submitted by the M.A. application deadline in the senior year. Applicants are expected to meet the same standards as those seeking admission to the M.A. program: they must submit a written statement of purpose; a Stanford transcript; three letters of recommendation, at least two of which should be from members of the department of concentration; and scores from the General Test of the Graduate Record Exam. In addition, applicants must provide a list of courses they intend to take to fulfill degree requirements. The decision on admission rests with the M.A. admissions committee of the Center for East Asian Studies. 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.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

OVERSEAS PROGRAMS IN EAST ASIAN STUDIES

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.

Internships—Undergraduates of any major may apply for summer internship opportunities in China, Japan, and Korea through the Bing Overseas Studies Program office.

Beijing—Stanford undergraduates may live and study at Peking University through the Overseas Studies Program in Beijing. Classes are taught in English by Stanford faculty-in-residence and Peking University professors. Students are considered enrolled in Peking University and may participate in athletic and musical activities on campus, including Chinese art and calligraphy, tai-chi, and wu shu. See http://osp.stanford.edu/beijing.

Kyoto—Students interested in the study of Japanese language, history, culture, and social organization may attend one or two quarters at the Kyoto Center for Japanese Studies which is supported by a consortium of 13 American universities including Stanford. The Bing Overseas Studies Program also offers a Spring Quarter program focused on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries at the Stanford Center in Technology and Innovation (SCTI). An internship in a Japanese firm, laboratory, or agency follows the SCTI training program. See http://osp.stanford.edu/kyoto.

Overseas Seminars—Three-week seminars led by Stanford faculty are offered in late summer before the beginning of Autumn Quarter, with destinations and study topics changing each year. For more information about Bing Overseas Studies programs, visit their office at Sweet Hall, or see http://osp.stanford.edu.

GRADUATE PROGRAMS 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, Asian Languages, Comparative Literature, History, Linguistics, 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 two postdoctoral fellowships in Chinese Studies each year. Postdoctoral fellowships in Japanese Studies are available from the Freeman-Spogli Institute of International Studies. The Walter H. Shorenstein Asia-Pacific Research Center has a postdoctoral program in contemporary Korean Studies.

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.

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 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 strong 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

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. Applications for admission and financial aid should be made online; see http://gradadmissions.stanford.edu.

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 or Japanese 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.

Students in the M.A. program are 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.

Area Studies Requirement—Students must complete the 1-unit core course, EASTASN 330, and an additional nine courses numbered 100 or above related to East Asia. Chinese and Japanese language courses numbered 100-199 are considered to be at the third-year level and do not count toward the courses required for the degree. The nine courses must be 3 or more units, taken for a letter grade. At least 23 units must be designated primarily for graduate students, typically at the 200-300 levels.

An integral part of the program is training in research and a demonstration of research ability in a discipline. Three courses, one of which must be a seminar, colloquium, or advanced course in which a research paper on China, Korea, or Japan is written, must be within a single department. The six additional area courses may be taken in departments of the student's choosing. 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. Credit toward the area studies requirement is not given for courses taken before entering the M.A. program. Students in this program may, however, take courses for exchange credit at the University of California, Berkeley, with the approval of their adviser and the Office of the 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.

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 11.25 quarter units of Law School courses with East Asian Studies content may be counted toward the M.A. degree. For more information, see the "Joint Degree Programs" section of this bulletin.

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, 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, Mordecai Kurz, 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: Liran Einav, Muriel Niederle, Luigi Pistaferri
Assistant Professors: Ran Abramitzky, Manuel Amador, Nicholas A. Bloom, Giacomo DeGiorgi, Doireann Fitzgerald, Kyna Fong, Peter R. Hansen, Matthew Harding, Nir Jaimovich, Seema Jayachandran, Jakub Kastl, Fuhito Kojima, Aprajit Mahajan, Kalina Manova, Petra Moser, Michele Tertilt
Acting Assistant Professor: Anamarie Pieschacon
Senior Lecturer: Geoffrey Rothwell
Lecturers: Haggay Etkes, Maria Fitzpatrick, Ward Hanson, Hamilton Helmer, Faye Steiner
Courtesy Professors: Anat Admati, David Baron, Jay Bhattacharya, Jeremy Bulow, John Ferejohn, Alan Garber, Ilan Guttman, Stephen Haber, Peter Blair Henry, David Kreps, N. Grant Miller, Rosamond Naylor, Maria Ogneva, Bruce Owen, A. Mitchell Polinsky, Peter C. Reiss, D. John Roberts, James Strnad, Barry Weingast, Robert Wilson
Visiting Professors: Alexander Galetovic, Matthew Kotchen, Ernesto Shargrodsky
Acting Instructors: Marcelo Clerici-Arias, Alex Gould, Mark Tendall
Fellows: Latika Chaudhary, Kristin Kiesel

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Web Site: http://www-econ.stanford.edu

Courses offered by the Department of Economics have the subject code ECON, and are listed in the "Economics (ECON) Courses" section of this bulletin.

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 undergraduate program provides an excellent background for those going on to graduate work in the professional schools (for example, business and law) and may also be structured to prepare students for a Ph.D. program in economics. The department's curriculum is an integral part of Stanford's programs in International Relations, Public Policy, and Urban Studies.

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.

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, and public finance.

UNDERGRADUATE PROGRAMS IN ECONOMICS

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, 121, 126, 140,* 141, 145, 149, 157, 160, 164, 165, 166 (5 units each).

Writing in the Major Course (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.

Advanced placement credit cannot be used to substitute for ECON 1A,B. Students who plan to declare Economics as a major or a minor may petition to the Director of Undergraduate Studies to waive the ECON 1A,B requirement for graduation and for prerequisites to other Economics courses.

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 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://www-econ.stanford.edu/academics/degrees-ugrad.html. 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) may be chosen from the following list: ECON 102A, 102B, 111, 115, 118, 121, 126, 140,* 141, 145, 149, 157, 160, 165, 166.

* 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.

GRADUATE PROGRAMS IN ECONOMICS

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 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 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 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:

H-1: Theoretical Econometrics: To receive credit in the theoretical econometrics subfield, students must complete 273A and 273B.

H-2: Applied Econometrics: To receive credit in the applied econometrics subfield, students must complete 273A and either 274 or 275. 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 274 or 275.

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.

OTHER PROGRAMS

Other programs leading to dual degrees may be arranged. For example, the Ph.D. in Economics combined 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 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.

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 this degree in preparation for the 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. 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.
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, 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 '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

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 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 30 semester (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 36 semester (54 quarter) hours of approved courses may be counted

toward both degrees. In either case, no more than 24 semester (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) 3 1/3 semester (5 quarter) hours in the case of the M.A. and 6 2/3 semester (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.

ENGLISH

Emeriti: (Professors) George H. Brown, W. B. Carnochan, George G. Dekker, 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, Arnold Rampersad, Ronald A. Rebholz, 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: Andrea A. Lunsford
Professors: John B. Bender (English, Comparative Literature), Eavan Boland, Terry Castle (on leave), W. S. Di Piero (on leave Autumn, Winter), J. Martin Evans (on leave Spring), John Felstiner (on leave Autumn), Kenneth W. Fields, Shelley Fisher Fishkin (on leave Winter, Spring), Roland Greene (English, Comparative Literature), Gavin Jones, Seth Lerer (English, Comparative Literature; Autumn only), Andrea A. Lunsford, Franco Moretti (English, Comparative Literature), Stephen Orgel, Patricia A. Parker (English, Comparative Literature), Peggy Phelan (English, Drama), Robert M. Polhemus, David R. Riggs, Ramón Saldívar (English, Comparative Literature; on leave), Jennifer Summit, Elizabeth Tallent (on leave Winter), Tobias Wolff
Associate Professors: Michele Elam, Denise Gigante, Ursula Heise, Blair Hoxby, Nicholas Jenkins, Paula Moya (on leave), Blakey Vermeule, Alex Woloch
Assistant Professors: Claire Jarvis, Michelle Karnes, Saikat Majumdar, Judith Richardson (on leave), Stephen Sohn, Hannah Sullivan
Senior Lecturer: Christopher Rovee
Courtesy Professors: David Palumbo-Liu, Bryan Wolf
Courtesy Associate Professor: Joshua Landy
Lecturers: Molly Antopol-Johnson, Keith Ekiss, Skip Horack, Maria Hummel, Scott Hutchins, Adam Johnson, Tom Kealey, David MacDonald, Michael McGriff, Hilton Obenzinger, Linda Paulson, Angela Pneuman, Rita Mae Reese, Bruce Snider, Alice Staveley, Shimon Tanaka, Joshua Tyree, Michael Wyatt
Consulting Professors: Valerie Miner, Carol Shloss
Consulting Assistant Professor: Matthew Jockers
Visiting Professors: Mark Doty, Mary Gordon

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Courses offered by the Department of English have the subject code ENGLISH, and are listed in the "English (ENGLISH) Courses" section of this bulletin.

MISSION OF THE DEPARTMENT OF ENGLISH

The Department of English seeks to teach and promote an understanding of the significance and history of British, American, and Anglophone literatures and to foster an appreciation of the richness and variety of texts in the language. The undergraduate program offers rigorous training in interpretive thinking and precise expression, teaching students to invent ideas, organize them, draw deductions and make connections to new ideas, and articulate them in eloquent and convincing ways. The English graduate program features the study of imaginative language, rhetoric, and the poetic and narrative arts and it focuses on the roles that imaginative writing and representations play in almost every aspect of human experience. Completing the B.A., M.A., or Ph.D. curricula prepares students of English to adapt, to think, and to communicate inventively, and to be cultured and humane in their approach to life.

UNDERGRADUATE PROGRAMS IN ENGLISH

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.

Suggested or Recommended Courses—
IHUM 34A,B. A Life of Contemplation or Action: Debates in Western Literature and Philosophy
ENGLISH 9/109. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton and their Contemporaries
ENGLISH 20/120. Masterpieces of English Literature II: From the Enlightenment to the Modern Period
ENGLISH 21/121. Masterpieces of American Literature
ENGLISH 47/147. Masterpieces of Contemporary Literature

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.

DEGREE REQUIREMENTS

Those interested in majoring in English are encouraged to declare by the beginning of their junior year, but 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 advisor; and submit a completed program proposal form approved by the advisor. It is recommended that a student meet with the advisor at least once per quarter to discuss progress towards degree completion.

With the exception of ENGLISH 160. Poetry and Poetics, which must be taken for a letter grade, any two of the requisite courses may be taken on a satisfactory/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. 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—
1. ENGLISH 160. Poetry and Poetics (WIM, 5 units)
2. Two courses in British Literature before 1750 (10 units)

3. Two courses in British Literature 1750-1900 or American Literature before 1900, or one of each (10 units)
4. One course in Shakespeare (5 units)
5. One course in critical methods (5 units)

Rules that apply to all English majors irrespective of field of study or degree option—

1. At least one course must be in American Literature
2. At least one course must be in British Literature after 1750
3. At least one course must be a major's seminar
4. Courses can only be counted once, i.e. can only satisfy 1 requirement

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 and American 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 25 additional units of approved courses including:

1. Three elective courses, chosen from among those offered by the Department of English, from one of the following concentrations:
   a. a specific genre: drama, film, lyric poetry, or prose fiction
   b. a specific historical period: literature before 1750, literature between 1750 and 1900, or literature after 1900
   c. one of the following areas of interest: gender and sexuality; language and rhetoric; literary theory; race and ethnicity; or single authors
   d. an alternative, well-defined area of interest with the approval of their adviser and the Director of Undergraduate Studies
2. Two additional 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 two elective courses, students may choose one upper-division course in a foreign literature read in the original language.

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 20th-century literature
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 with an emphasis in either Prose or Poetry: Prose writers must take ENGLISH 146. Development of the Short Story, and two intermediate or advanced prose classes: ENGLISH 190,190F, 190G, 190P, 190R, 190V, 191, or 290. Poetry writers must take two intermediate or advanced poetry classes: ENGLISH 192, 192P,V, or 292, and one other literature course in poetry to be approved by a professor in the Creative Writing program.

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 a senior honors essay (ENGLISH 197), a senior independent essay (ENGLISH 199), an individual research paper (ENGLISH 194 or 198), or a paper integrating the material in two courses the student is taking in two different disciplines.

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.

V. Literature and Philosophy—Students should declare the English Literature major in Axess, and 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 35-45 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. 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: two courses in the history of Philosophy, numbered above PHIL 100.
6. Two upper division courses of special relevance to the study of Philosophy and Literature. 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 the following English major requirements before the start of their senior year: critical methods and Poetry and Poetics (ENGLISH 160).

In September before the senior year, students are encouraged to participate in Bing Honors College. In the 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

HONORS PROGRAM IN HUMANITIES

An honors program in Humanities is available for English Literature majors who wish to supplement the major with a related and carefully guided program of studies. See the "Interdisciplinary Studies in Humanities" section of this bulletin for a description of the program. Students wishing to take the Comparative Literature option within the honors program in Humanities should see the "Comparative Literature" section of this bulletin.

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. ENGLISH 160. Poetry and Poetics
2. One course from each of the following historical periods:
   a. British literature to 1750
   b. British literature from 1750 to 1900 or American literature before 1900
   c. 20th-century British or American literature
3. One course in Shakespeare
4. Two elective courses, 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. Introduction to Creative Writing: Form and Structure
2. ENGLISH 146. The Development of the Short Story (prose writers), *or* ENGLISH 160. Poetry and Poetics (poetry writers)
3. Four writing workshops, three in the chosen concentration, one outside
   a. Prose writers must first take one beginning prose class ENGLISH 90, Fiction Writing, or ENGLISH 91, Creative Nonfiction, then two intermediate or advanced prose classes: ENGLISH 190, 190F,G,P,R,V, 191, or 290. Prose writers must also take ENGLISH 92, Poetry Writing.
   b. Poetry writers must first take ENGLISH 92, Poetry Writing, then two intermediate or advanced poetry classes ENGLISH 192, 192P,V, or 292. Poetry writers must also take one beginning prose class, ENGLISH 90, Fiction Writing, or ENGLISH 91, Creative Nonfiction.

GRADUATE PROGRAMS IN ENGLISH

The English Department seeks to teach and promote an understanding of both the significance and the history of British and American literature, broadly defined, and to foster an appreciation of the richness and variety of texts in the language. It offers rigorous training in interpretive thinking and precise expression. The English graduate program features the study of what imaginative language, rhetoric, and narrative art has done, can do, and may yet do in life, and it focuses on the roles that creative writing and representations play in almost every aspect of modern experience. Graduate students are admitted as candidates for only the Ph.D. or the M.A. in English and American Literature.

MASTER OF ARTS IN ENGLISH

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

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. The M.A. program is a terminal, one-year program without financial aid.

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. ENGLISH 296. Introduction to M.A. Studies
2. Two courses in literature before 1800
3. Two courses in literature after 1800

Optional Courses—Four 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 five required courses and two elective courses. These courses are chosen by the student and approved by the adviser and the Director of Graduate Studies.

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 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://registrar.stanford.edu/shared/publications.htm#Coterm.

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 requirement 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, FRENLANG 50, ITALLANG 50, GERLANG 52, and SPANLANG 50, respectively, with a grade of 'B' or higher.

OTHER PROGRAMS IN ENGLISH

Ph.D. in English and Humanities—The Department of English participates in the Graduate Program in Humanities leading to the Ph.D. degree in English and Humanities. For a description of that program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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 chair 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.

ETHICS IN SOCIETY PROGRAM

Director: Rob Reich
Steering Committee: Eamonn Callan (Education), Joshua Cohen (Philosophy, Political Science, Law), John Ferejohn (Political Science), Barbara Fried (Law), Scotty McLennan (Dean of Religious Life), Josiah Ober (Classics, Political Science), Eric Roberts (Computer Science), Debra Satz (Philosophy), Brent Sockness (Religious Studies), Allen Wood (Philosophy), Lee Yearley (Religious Studies)
Affiliated Faculty: Kenneth Arrow (Economics, emeritus), Donald Barr (Sociology), Barton Bernstein (History), Michael Bratman (Philosophy), Albert Camarillo (History), Nadeem Hussain (Philosophy), David Kennedy (History), Benoît Monin (Psychology), Tamar Schapiro (Philosophy), David K. Stevenson (Pediatrics), Sylvia Yanagisako (Anthropology)

Mail Code: 94305-2155
Phone: (650) 723-0997
Email: joanberry@stanford.edu
Web Site: http://ethicsinsociety.stanford.edu

Courses offered by the Program in Ethics in Society have the subject code ETHICSOC, and are listed in the "Ethics in Society (ETHICSOC) Courses" section of this bulletin.

The Program in 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.

Along with the McCoy Family Center for Ethics in Society, the program also sponsors several annual public lecture series, including the Tanner Lectures in Human Values and the Wesson Lectures in Problems of Democracy.

Students interested in pursuing studies that bring moral and political theory to bear on issues in public life should consult the director. 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. Students should consult the director to determine whether such courses may be applied towards an Ethics in Society honors program or minor.

GRADUATE OFFERINGS

The program's main provisions for graduate students are seminars on topics in applied ethics.

UNDERGRADUATE PROGRAMS IN ETHICS IN SOCIETY

HONORS IN ETHICS IN SOCIETY

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 no later than 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.

Requirements—

1. Required courses (at least one of a or b must be taken at the 100 level):
   a. ETHICSOC 20. Introduction to Moral Theory; *or* ETHICSOC 170. Ethical Theory. Normally taken by the end of the sophomore year.
   b. ETHICSOC 30. Introduction to Political Philosophy; *or* ETHICSOC 171. Justice. Normally taken by the end of the sophomore year.
2. Two 4- or 5-unit undergraduate courses* on a subject approved by the honors adviser, designed to encourage students to explore those issues in Ethics in Society that are of particular interest to them. Courses of relevance to the Program in Ethics in Society are offered by members of the steering committee and by other departments. Students may also take a course with the honors thesis in mind. To promote a broad interdisciplinary approach, this elective should normally be outside the Department of Philosophy. Students are not restricted to choosing from the cognate courses listed below.
3. ETHICSOC 190. Honors Seminar.
4. ETHICSOC 200A,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.

A typical student takes ETHICSOC 20 or 170 and 30 or 171 by the end of the sophomore year. Upon admission to the honors program as a junior, he or she takes ETHICSOC 190 in Winter Quarter and requirement 2 (the optional subjects) at any time during the junior year, or possibly Autumn Quarter of the senior year. The honors thesis is normally written during Autumn and Winter quarters of the senior year. Courses taken to fulfill the Ethics in Society honors requirement may be double-counted for Philosophy and other majors; Ethics in Society minors may not double count courses.

*The following courses may be used to fulfill requirement 2. The honors adviser can approve additional courses.

ANTHRO 90A. History of Archaeological Thought
ANTHRO 90B. Theory of Cultural and Social Anthropology
ANTHRO 179. Cultures of Disease: Cancer
ANTHRO 326B. Conduct and Misconduct in Science
ARCHLGY 103. History of Archaeological Thought
COMM 131. Media Ethics and Responsibilities
COMM 236G. Democracy, Justice, and Deliberation
COMM 238. Democratic Theory: Normative and Empirical Issues
ECON 224. Science, Technology, and Economic Growth
EDUC 137X. Social Justice in Education
EDUC 158. Children's Citizenship: Justice Across Generations
EDUC 167. Educating for Equity and Democracy
EDUC 179B. Youth Empowerment and Civic Engagement
EDUC 220C. Education and Society
EDUC 237X. Social Justice in Education
EDUC 247. Moral Education
EDUC 279B. Youth Empowerment and Civic Engagement
EDUC 304. The Philosophical and Educational Thought of John Dewey
OIT 333. Entrepreneurial Design for Extreme Affordability
HISTORY 236. The Ethics of Imperialism
HISTORY 243G. Tobacco and Health in World History
HISTORY 259A,B. Poverty and Homelessness in America I,II
HUMBIO 122S. Social Class, Race, Ethnicity, Health
IPS 241. International Security in a Changing World
INTNLREL 136R. Introduction to Global Justice
ME 206A. Entrepreneurial Design for Extreme Affordability
MED 83Q. Ethical Issues in Stem Cell Research

MS&E 197. Ethics and Public Policy (Same as PUBLPOL 103B.)
PHIL 174/274. Freedom and the Practical Standpoint
PHIL 242. The Philosophical and Educational Thought of John Dewey
PHIL 338. Hobbes and Rousseau (Same as POLISCI 338J.)
POLISCI 1. Introduction to International Relations
POLISCI 114S. International Security in a Changing World
POLISCI 123. Politics and Public Policy (Same as PUBLPOL 101.)
POLISCI 130B. History of Political Thought II: Early Modern Political Thought, 1500-1700
POLISCI 130C. History of Political Thought III: Freedom, Reason, and Power
POLISCI 131. Children's Citizenship: Justice Across Generations
POLISCI 132. Ethics of Political Animals
POLISCI 136R. Introduction to Global Justice
POLISCI 231S. Contemporary Theories of Justice
POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
POLISCI 330B. History of Political Thought II: Early Modern Political Thought, 1500-1700
POLISCI 330C. History of Political Thought III: Freedom, Reason, and Power
POLISCI 336. Introduction to Global Justice
PSYCH 179/270. The Psychology of Everyday Morality
PUBLPOL 164. Comparative Public Policy
PUBLPOL 180. Social Innovation
PUBLPOL 183. Philanthropy and Social Innovation
RELIGST 7N. The Divine Good: Secular Ethics and Its Discontents
SOC 130/230. Education and Society
SOC 141A. Social Class, Race, Ethnicity, Health
STS 110. Ethics and Public Policy
URBANST 131. Social Innovation and the Social Entrepreneur

MINORS 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. The minor also includes the possibility of pursuing classes around the theme of citizenship.

Students must declare the minor in Axess no later than the last day of Autumn Quarter of their senior year, although they are strongly advised to declare sooner. The student should discuss the minor with an adviser chosen from the Ethics in Society faculty list, and prepare a draft proposal that includes a list of courses planned to fulfill the requirements and the name of the faculty adviser.

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. Two Ethics in Society courses:
   a. ETHICSOC 20, Introduction to Moral Theory; *or* ETHICSOC 170, Ethical Theory
   b. ETHICSOC 30, Introduction to Political Philosophy; *or* ETHICSOC 171, Justice
2. Three courses at the 100 level or above that address some dimension of moral or political theory or practice.*
3. 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 2 and 3. The program director can approve additional courses.

The 100-level 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 ETHICSOC 20 or 170 and 30 or 171.

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 30/171. No course credited to the Ethics in Society minor may be double-counted toward major requirements.

CITIZENSHIP OPTION

The citizenship option for the minor introduces students to the theory, history, and practice of citizenship in democracies. When a student declares the minor in EIS in Axess, no notation is made of the citizenship option, and this notation does not appear on transcripts or the diploma. All students taking the citizenship option must take ETHICSOC 198, Community Engagement Internship. In addition to the courses listed in (1) above, students must take a total of three additional classes from two of the following categories. Students may petition to have other relevant courses counted towards the minor.

1. Citizenship and Government Action
   a. ETHICSOC 133. Ethics and Politics of Public Service
   b. POLISCI 142T. Social Protection Around the World
   c. PUBLPOL 101. Politics and Public Policy
   d. PUBLPOL 164. Comparative Public Policy
2. Citizenship and Entrepreneurship
   a. ETHICSOC 108. Ethics and the Professions
   b. ME 206A. Entrepreneurial Design to Extreme Affordability
   c. PUBLPOL 180. Social Innovation
   d. PUBLPOL 195. Business and Public Policy
   e. URBANST 131. Social Innovation and the Social Entrepreneur
3. Citizenship and Education
   a. EDUC 167. Educating for Equity and Democracy
   b. EDUC 179B. Youth Empowerment and Civic Engagement
   c. EDUC 220C. Education and Society
   d. EDUC 247. Moral Education
   e. EDUC 304. The Philosophical and Educational Thought of John Dewey
4. Global Citizenship and Nongovernmental Organizations
   a. POLISCI 143. Nongovernmental Organizations and Development in Poor Countries
   b. POLISCI 236. Civil Society and the Nonprofit Sector
   c. PUBLPOL 183. Philanthropy and Social Innovation

FEMINIST STUDIES

Director: Heather Hadlock
Program Committee: Heather Hadlock (Music), Miyako Inoue (Anthropology), Helen Longino (Philosophy), Valerie Miner (Feminist Studies), Londa Schiebinger (History), Elizabeth Tallent (English)
Resource Faculty:
Anthropology: Melissa Brown, Paulla Ebron, Miyako Inoue, Sarah Jain, Matthew Kohrman, Barbara Voss, Sylvia Yanagisako
Art and Art History: Wanda Corn, Pamela Lee, Melinda Takeuchi
Asian Languages: James R. Reichert, Yoshiko Matsumoto
Biology: Joan Roughgarden
Business: Joanne Martin
Classics: Maud Gleason, Susan Stephens
Comparative Literature: Patricia Parker
Developmental Biology: Ellen Fitzsimmons Porzig
Drama: William Eddelman, Harry J. Elam, Cherríe Moraga, Peggy Phelan
Education: Susanna Loeb, Joy Williamson, Christine Min Wotipka
English: Eavan Boland, Terry Castle, Michele Elam, Andrea Lunsford, Paula Moya, Sianne Ngai, Stephen Orgel, Ramón Saldívar, Jennifer Summit, Elizabeth Tallent
Feminist Studies: Nicole Baran, Patricia Karlin-Neumann, Susan Krieger, Valerie Miner
French and Italian: Carolyn Springer
German Studies: Kathryn Strachota
History: Philippe Buc, Paula Findlen, Estelle Freedman, Katherine Jolluck, Nancy Kollmann, Carolyn Lougee Chappell, Paul Robinson, Londa Schiebinger, Matthew Sommer, Laura Stokes, Kären Wigen
Human Biology: Anne Firth-Murray
Law: Deborah Rhode
Linguistics: Penelope Eckert, Arnold Zwicky
Medical School: Ann Arvin, Helen Blau, Roy King, Cheryl Koopman, Iris Litt
Music: Heather Hadlock
Philosophy: Helen Longino, Debra Satz
Political Science: Terry Karl
Psychology: Albert Bandura, Laura Carstensen, Hazel Markus
Religious Studies: Charlotte Fonrobert, Hester Gelber, Linda Hess
Slavic Languages and Literatures: Monika Greenleaf
Sociology: Paula England, Cecilia Ridgeway
Spanish and Portuguese: Yvonne Yarbro-Bejarano

Program Office: 450 Serra Mall-Main Quad, Building 110, Room 111M
Mail Code: 94305-2140
Phone: (650) 723-2412
Email: zamoram@stanford.edu
Web Site: http://feminist.stanford.edu

The Program in Feminist Studies is an undergraduate interdisciplinary program offering students the opportunity to investigate the significance of gender and sexuality in all areas of human life. Feminist analysis examines how gender is embedded in society, intersecting with other relations of power, such as class, race, ethnicity, sexuality and age. The courses offered by the program use feminist perspectives to expand and reevaluate the assumptions at work in traditional disciplines in the study of individuals, cultures, social institutions, policy, and other areas of scholarly inquiry.

The Program in Feminist Studies coordinates the courses offered on women, gender, sexuality, and feminism throughout the University, offering a strong curriculum in Feminist and Queer/LGBT Studies and an emphasis on diversity and transnationality. 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. Each student majoring or minoring in Feminist Studies builds his or her interdisciplinary program around a focus, which serves to integrate courses from across departments.

The program committee awards the annual Michelle Z. Rosaldo and Francisco Lopes prizes for the best undergraduate work on women, feminism, gender or sexuality. The prizes are awarded in two divisions: an essay division, and a thesis division for senior honors theses and masters' papers written by undergraduates in coterminal degree programs. The Rosaldo prizes are awarded for the best work in the social sciences and the Lopes prizes in the humanities. For more information, see the Program web site.

Courses offered by the Program in Feminist Studies have the subject code FEMST, and are listed in the "Feminist Studies (FEMST) Courses" section of this bulletin.

UNDERGRADUATE PROGRAMS IN FEMINIST STUDIES

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.

BACHELOR OF ARTS IN FEMINIST STUDIES

The major in Feminist Studies 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 by 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 presents the student's selected focus and outlines a course of study to support that focus. 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 103.
2. Designated feminist theory course. See the Feminist Studies web site to see which courses fulfill the theory requirement this year.
3. FEMST 103. Feminist Theories and Methods
4. FEMST 104A,B. Practicum
5. One Feminist Studies or cognate course in the social sciences. Courses that fulfill this requirement can be found among courses listed under Anthropology, Communication, Education, History, Human Biology, Law, Medicine, Political Science, Psychology, and Sociology.
6. One Feminist Studies or cognate course in the humanities. Courses that fulfill this requirement can be found among courses listed in English, Linguistics, Philosophy, Religious Studies, the arts, and languages.

THE FOCUS

Every student designs a thematic focus consisting of at least five courses. These foci are not declared on Axess; they do not appear on the transcript or diploma.

1. At least three of the focus courses should be Feminist Studies or cognate courses.
2. 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.
3. At least one course within the thematic focus should address crosscultural issues.
4. The focus should be designed in consultation with the student's advisers. The following are examples of common foci, but students are also encouraged to develop new ones:
   Chicana Feminisms
   Cross Cultural Perspectives on Gender
   Feminist Perspectives on Science, Technologies, and Health
   Gender and Education
   Gender and Popular Culture
   Gender in Literature and Language
   Gender, Race, and Nation
   Gender Rights and Human Rights
   Masculinities
   Medieval Gender Studies
   Queer Studies
   Race, Class, and Gender
   Transnational Feminisms
   Women, Creativity, and the Arts
   Women's Health
   Women's Literature
   Women and Religion

WRITING IN THE MAJOR (WIM)

Majors in Feminist Studies must satisfy the Writing in the Major (WIM) requirement in 2008-09 by taking FEMST 253, Women and the Creative Imagination, in Spring Quarter. Honors students satisfy the WIM requirement through their honors work.

PRACTICUM

A practicum is required in order to bring 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.

ELECTIVES

Students are encouraged to take electives that provide intellectual breadth in the program and contribute to the 63-unit requirement.

HONORS CERTIFICATION

FEMINIST STUDIES MAJORS/MINORS

Admission—The honors program offers an opportunity to do independent research for a thesis of superior academic quality. 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 program mentor. A proposal describing the project and the number of units to be awarded must be submitted to the director of the program for final approval. See the Feminist Studies web site for details.

Requirements—

1. In addition to the normal requirements for the major, students enroll in FEMST 105 for 10-15 units towards the preparation of the honors thesis, and one unit of directed research with the director of the program (Autumn, Winter, and Spring quarters for a total of 3 units), which is granted for satisfactory progress and attendance at meetings conducted by the honors tutor throughout the year.
2. Throughout the senior year, students work with faculty advisers and the honors tutor. The final thesis must be submitted by May 30 and be of acceptable quality to the student's faculty adviser. Creative projects of high intellectual caliber are eligible if they contain a section of scholarly analysis. For more information, see http//feminist.stanford.edu.

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 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 will outline a plan for course work and design an honors project in consultation with their proposed thesis adviser and the program mentor. The final proposal describing the project and the number of units to be awarded 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 for 10-15 units towards the preparation of the honors thesis, and 1 unit of directed research with the director of the program (Autumn, Winter, and Spring quarters for a total of 3 units), which is granted for satisfactory progress and attendance at meetings conducted by the honors tutor throughout the year.
2. Throughout the senior year, students work with faculty advisers and the honors tutor. The final thesis must be submitted by May 30, and must be of acceptable quality to the student's faculty advisers. Creative projects of high intellectual caliber are eligible if they contain a section of scholarly analysis. For more information, see http://feminist.stanford.edu.

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.

AMSTUD 183. Border Crossings and American Identities
ANTHRO 151. Women, Fertility, and Work
ANTHRO 180. Science, Technology, and Gender
ANTHRO 180A. Biological and Evolutionary Perspectives on Gender and Sexuality
ANTHRO 186. Kinship and Gender in South Asia
ANTHRO 218. Literature, Politics, and Gender in Africa
ANTHRO 346A. Sexuality Studies in Anthropology
BIO 185. Evolution of Reproductive Social Behavior
CHICANST 122. Introduction to Latina Literature
CHICANST 165A. Chicana/o History
CLASSGEN 117. Gender, Violence, and the Body in Ancient Religion
CLASSGEN 119. Gender and Power in Ancient Rome
CSRE 145A. Poetics and Politics of Caribbean Women's Literature
DRAMA 110. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts
DRAMA 160. Performance, Dance, and History
DRAMA 163. Performance and America
DRAMA 177. Playwriting
DRAMA 179F. Flor y Canto: Poetry Workshop
DRAMA 189Q. Mapping and Wrapping the Body
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 112A. Wicked Witches of the West: Dangerous Women in Greek and Shakespearean Tragedy
ENGLISH 122. Jane Austen into Film
ENGLISH 137A. Oscar Wilde
ENGLISH 150D. Women Poets
FILMSTUD 220. Being John Wayne
HISTORY 161. U.S. Women's History, 1890s-1990s
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 234A. Marie Antoinette on Trial
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
HPS 156. History of Women and Medicine in the United States
HUMBIO 125. Current Controversies in Women's Health
HUMBIO 129. Critical Issues in International Women's Health
INDE 245. Women and Health Care
LAW 307. Gender, Law, and Public Policy
LINGUIST 156. Language and Gender
RELIGST 120. Women in Contemporary Islam
RELIGST 172. Sex, Body, and Gender in Medieval Religion
SOC 123. Sex and Love in Modern Society
SOC 142. Sociology of Gender
SPANLIT 193. The Cinema of Pedro Almodóvar

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

FOCUS

A four-course thematic focus may be designed by the student or may follow one of the suggested clusters listed above. One course within the thematic focus should address crosscultural issues.

FINANCIAL MATHEMATICS

Director: Tze Leung Lai
Steering Committee: A. Dembo, K. Giesecke, T. Lai, A. Owen, G. Papanicolaou, J. Primbs, K. Singleton, A. Toussaint
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, D. Luenberger, J. Primbs
Mathematics: S. Brendle, A. Dembo, P. Diaconis, G. Papanicolaou, A. Toussaint
Statistics: T. Cover, A. Dembo, P. Diaconis, T. Lai, A. Owen, B. Rajaratnam

This is an interdisciplinary program that provides a master's level education in applied and computational mathematics, statistics, and financial applications to individuals with strong mathematical skills. The departments of Mathematics and Statistics, in close cooperation with the departments of Economics, and Management Science and Engineering, as well as the Graduate School of Business, provide many of the basic courses.

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 taken the following courses or their equivalent:
1. Linear algebra at the level of MATH 103.
2. Advanced calculus (real analysis) at the level of MATH 115.
3. Basic ordinary and partial differential equations at the level of MATH 131 and 132 (basic partial differential equations).
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.

Some of these courses are offered as summer courses and may be taken by candidates lacking the required background.

Candidates for admission must take the general Graduate Record Examination and preferably the subject test in Mathematics as well. Information about these exams can be found at http://www.gre.org.

Requirements—The program requires that the student take 45 units of work. 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 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 a letter grade, but students may elect to take one of the 12 courses credit/no credit. An overall grade point average (GPA) of 2.75 is required. A seminar in Financial Mathematics is an integral part of the program and an opportunity to interact with leading academic and industry speakers (for credit, enroll in STATS 239AB). There is no thesis requirement.

Any remaining units required to complete the 45 total must be taken from the following options:
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).

Ordinarily, four quarters are needed to complete all requirements.

Required Courses—For the M.S. degree in Financial Mathematics, students must fulfill six of these required courses:
1. In stochastic processes and statistics:
   a. MATH 236. Introduction to Stochastic Differential Equations
   b. STATS 241. Statistical Modeling in Financial Markets
2. In differential equations, simulation, and computing:
   a. MATH 227. Partial Differential Equations and Diffusion Processes
      or STATS 362. Monte Carlo Sampling
   b. MATH 239. Computation and Simulation in Finance
3. In finance and economics:
   a. MS&E 242H. Investment Science Honors
      or MATH 240. Topics in Financial Mathematics: Fixed Income Models
   b. MATH 238/STATS 250. Mathematical Finance

Courses that are equivalent to the above and have been taken previously may be waived by the adviser, in which case they must be replaced by elective courses in the same subject area.

The requirements must be met within two years of entering the program, or four academic quarters for those already at Stanford.

Elective Courses—Each candidate must take at least six approved elective courses from the list below.
1. At least two electives in Probability, Stochastic Processes or Statistics from:
   Statistics:
   STATS 202. Data Analysis
   STATS 206. Applied Multivariate Analysis
   STATS 207. Introduction to Time Series Analysis
   STATS 219. Stochastic Processes (Same as MATH 136)
   STATS 220. Continuous Time Stochastic Control
   STATS 237. Time Series Modeling and Forecasting
   STATS 240. Statistical Methods in Finance
   STATS 252. Data Mining and Electronic Business
   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 324. Multivariate and Random Matrix Theory
   STATS 343. Time Series Analysis
   EE 376A. Information Theory
   Mathematics:
   MATH 136. Stochastic Processes (Same as STATS 219)
   MATH 205A/B. Real Analysis
   MATH 237. Stochastic Equations and Random Media
   Economics:
   ECON 275. Time Series Econometrics
2. At least two electives in Differential Equations, Optimization, Simulation, or Computing from:
   Mathematics:
   MATH 220. PDE of Applied Mathematics
   MATH 222A. Computational Methods for Fronts, Interfaces, and Waves
   MATH 256A,B. Partial Differential Equations
   MATH 261A,B. Functional Analysis
   MATH 266. Time Frequency Analysis and Wavelets
   Statistics:
   STATS 212. Applied Statistics with SAS
   STATS 227. Statistical Computing
   STATS 235. Decision Making in Financial Services
   STATS 322. Function Estimation in White Noise
   Computer Science:
   CS 106X. Programming Abstractions (Accelerated)
   CS 193D. C++
   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
   Management Science and Engineering:
   MS&E310. 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 347. Credit Risk: Modeling and Management
MS&E 348. Optimization of Uncertainty and Applications in Finance
MS&E 351. Dynamic Programming and Stochastic Control
Graduate School of Business:
OIT 667. Revenue Management*

3. At least two electives in Economics or Finance from:
Economics:
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 281. Economics of Uncertainty
ECON 284. Topics in Dynamic Economics
Mathematics:
MATH 180. Introduction to Financial Mathematics
Statistics:
STATS 243. Introduction to Mathematical Finance (summer version of MATH 180)
Management Science and Engineering:
MS&E 247G. International Financial Management (Same as FINANCE 323)*
MS&E 247S. International Investments
MS&E 341. Advanced Economic Analysis
MS&E 342. Advanced Investment Science
MS&E 345. Advanced Topics in Financial Engineering
MS&E 347. Credit Risk: Modeling and Management
MS&E 444. Investment Practice*
Graduate School of Business:
FINANCE 320. Debt Markets*
FINANCE 326. Derivative Securities*
FINANCE 328. Portfolio Management*
FINANCE 621. Financial Markets II
FINANCE 622. Dynamic Asset Pricing Theory
GSB 629. Tax and Finance Seminar
MGTECON 600. Microeconomic Analysis
MGTECON 604. Advanced Econometrics
MGTECON 609. Applied Econometric and Economics Research

*Indicates courses of limited enrollment and/or the instructor's preapproval is needed for registration.

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.

FRENCH AND ITALIAN

Emeriti: (Professors) John G. Barson, Marc Bertrand, Robert G. Cohn, John Freccero, René Girard, Ralph M. Hester, Pauline Newman-Gordon, Roberto B. Sangiorgi, Leo Weinstein
Chair: Robert Harrison
Directors of Graduate Studies: Jean-Marie Apostolidès (French), Jeffrey Schnapp (Italian)
Directors of Undergraduate Studies: Cécile Alduy (French, Winter, Spring), Jean-Marie Apostolidès (French, Autumn), Carolyn Springer (Italian)
Professors: Jean-Marie Apostolidès, Jean-Pierre Dupuy, Hans U. Gumbrecht, Robert Harrison, Elisabeth Mudimbe-Boyi (on leave Autumn), Jeffrey T. Schnapp, Michel Serres
Associate Professors: Joshua Landy (on leave), Carolyn Springer
Assistant Professors: Cécile Alduy (on leave Autumn), Dan Edelstein (on leave), Marisa Galvez, Laura Wittman
Lecturer: Sarah Sussman
Visiting Lecturers: Joël Castonguay-Bélanger, Sabrina Ferri, Rima Joseph
Courtesy Professors: Keith Baker, Margaret Cohen, Paula Findlen, Michael Marrinan
Visiting Professor: Remo Ceserani
Visiting Assistant Professor: Heather Webb

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Web Site: http://french-italian.stanford.edu

Courses offered by the Department of French and Italian have the subject codes FRENGEN, FRENLIT, ITALGEN, and ITALLIT. Courses in French General are listed in the "French General (FRENGEN) Courses" section of this bulletin. Courses in French Literature are listed in the "French Literature (FRENLIT) Courses" section of this bulletin. Courses in Italian General are listed in the "Italian General (ITALGEN) Courses" section of this bulletin. Courses in Italian Literature are listed in the "Italian Literature (ITALLIT) Courses" section of this bulletin. 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, commercial, 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 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 Director 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.

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 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.

UNDERGRADUATE PROGRAMS IN FRENCH AND ITALIAN

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 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 a 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 of which must be taken for a letter grade and must be selected in accordance with the following requirements:

1. *Advanced language* (ca. 4 units): at least one course from the following:
   FRENLANG 121. Introduction to French Texts
   FRENLANG 122. Introduction to French Culture and Civilization
   FRENLANG 124. Advanced French Grammar
   FRENLANG 126. French Stylistics and Textual Analysis
   OSPPARIS 125P. Advanced French II
2. *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. Authorship, Book Culture, and National Identity in Medieval and Renaissance France
   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
3. *Research Seminar* (5 units): a majors-only seminar, DLCL 189, must be taken in Autumn Quarter of the senior year. This course prepares and assists students as they undertake either their senior project (see below) or honors thesis. It also familiarizes them with research resources in the department and University and helps students think critically about their research topics. By the end of the course, students must have chosen an adviser, generally a faculty member in the department, who offers support and feedback throughout the development of the senior project or honors thesis.
4. *Ancien Régime courses* (ca. 8 units): at least two courses must concern the period before July 1789. 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 Director of Undergraduate Studies.
   FRENGEN 204. Love Songs
   FRENGEN 219. The Renaissance Body
   FRENGEN 233. The Afterlife of the Middle Ages
   FRENLIT 207. Writing Utopia in 18th- and 19th-Century France
   FRENLIT 222. The Political Unconscious of the *Ancien Régime*
   FRENLIT 224. Libertinage in 17th- and 18th-Century French Literature
   FRENLIT 225. Multicultural Molière
5. *Upper-level French courses* (ca. 8 units): at least two additional courses must be taken within the department. In total, at least 32 units of course work must be taken within the department. No more than three courses numbered lower than 130 may be counted towards the major.
   FRENGEN 122. Literature as Performance
   FRENGEN 181. Philosophy and Literature
   FRENGEN 190Q. Parisian Cultures of the 19th and Early 20th Centuries
   FRENGEN 211. Albert Camus and Jean-Paul Sartre: French Existentialism in the Post-World War II Period
   FRENGEN 215. Gottfried Benn and Francis Ponge: Mid-20th-Century European Poetry and the Problem of the Referent
   FRENGEN 232. Time of Latency: Western Cultures in the Decade After 1945
   FRENGEN 265. The Problem of Evil in Literature, Film, and Philosophy
   FRENGEN 285. The Gaze of Medusa: Literature and Photography and the Case of Michel Tournier

FRENGEN 288. Decadence and Modernism from Mallarmé to Marinetti
FRENLIT 151. 19th-Century Realism: Balzac Versus Flaubert
FRENLIT 165. The French Short Story, 1690-1780
FRENLIT 247. Science and Literary Discourse in 19th-Century France
FRENLIT 248. Literature, History, and Representation
FRENLIT 256. Mind and Body in 20th-Century French Fiction
FRENLIT 293A/B. Topics in French Literature and Philosophy

6. *Remaining courses* (ca. 22 units): the student is encouraged to use the remaining five or more courses to develop a specialized knowledge of a specific domain related to either the senior project or the honors thesis. These courses must show obvious internal consistency and relevance to the chosen focus, and must be approved by the Director of Undergraduate Studies. Where possible, students are encouraged to complete their written work in French. Of these courses, only one, for a maximum of 4 units, may be drawn from individual work (FRENLIT 199).

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

Relevant courses from other departments or programs may also earn credit toward the major with the consent of the Director of Undergraduate Studies, including these OSP courses:
OSPPARIS 21. Contemporary Art in Paris: A Trans-Idiomatic Survey
OSPPARIS 25. Literature and the City
OSPPARIS 66. Classical Paris
OSPPARIS 67. Representations of the Domestic in the Louvre
OSPPARIS 81. France During the Second World War: Between History and Memory
OSPPARIS 84. Foundations of French Political Culture: The Old Regime and the French Revolution
OSPPARIS 91. Globalization and its Effect on France and the European Union
OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design
OSPPARIS 107Y. The Age of Cathedrals: Religious Art and Architecture in Medieval France
OSPPARIS 186F. Contemporary African Literature in French
OSPPARIS 120X. French Painting in the 19th Century: Between Tradition and Revolution
OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison
OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France

Senior Project—In order to demonstrate the quality of his or her scholarly work and command of written French, each major not writing an honors thesis (see "Honors Program" below) is required to submit a senior project to the project adviser before May 15 of the senior year. The project consists of a research paper with a target length of 20 pages and must be written in French.

The senior project is not graded and no credit is offered for it. However, acceptance of the senior project by the project adviser is a condition for graduation from the department. A paper deemed unsatisfactory by the project adviser is returned to the student for rework and resubmission by an agreed-upon date.

Students are advised to begin thinking about their senior projects as early as their junior year, even if they are in Paris. While in Paris, students should avail themselves of the unique resources the city has to offer for research on their chosen topic.

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): at least one course from the following: FRENLANG 121, FRENLANG 122, FRENLANG 124, FRENLANG 126, or OSPPARIS 125P.
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:
    ENGLISH 152D/PHIL 194L. W.E.B. DuBois as Writer and Philosopher
    ENGLISH 184L. Confessions: Writing and Reading the Self
    HUMNTIES 197F/SLAVGEN 190/290. Tolstoy's *Anna Karenina* and the Social Thought of its Time
    PHIL 173A. Aesthetics: Metaphor across the Arts

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/NS; 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 one advanced language course (at the 120 level); 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 121 and above. Of these, only one may be taught in English. All courses must be chosen in consultation with the Director 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, save the senior project,

from which he or she is exempt. Instead, the student undertakes 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 Director 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 Director of Undergraduate Studies helps the student through the revision process until the proposal is granted his or her approval. The Director 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 advisor. 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 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

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 Great Works 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 above the 100 level.

The remaining requirements for the major are:

1. A minimum of 32 units of Italian courses (selected from courses numbered 100 and above):
   ITALGEN 149. New Frontiers in Italian Cinema
   ITALGEN 181. Philosophy and Literature
   ITALGEN 204. Love Songs
   ITALGEN 232. Time of Latency: Western Cultures in the Decade after 1945
   ITALGEN 238. Futurisms
   ITALGEN 264E. Petrarch and Petrarchism
   ITALGEN 288. Decadence and Modernism from Mallarmé to Marinetti
   ITALLIT 275. Politics and Religion in Modern Italian Fiction and Film
   ITALLIT 281. Italian Poetry Across the Ages
   ITALLIT 289. Italian Postmodernism
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 204, 264E, ITALLIT 281); a Dante course may fulfill the Middle Ages requirement.
   b. the early modern period (FRENGEN 219, ITALLIT 281); and
   c. the modern period (ITALGEN149, 232, 238, 288, ITALLIT 275, 281, 289).
3. The 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 above ITALLANG 113.
   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:
ENGLISH 185. Opera as Cultural History

Relevant courses from other departments or programs may also earn credit toward the major with the consent of the Director of Undergraduate Studies, including these OSP courses:
OSPFLOR 33. The Americanization of Italy
OSPFLOR 34. The Woman in Florentine Art
OSPFLOR 41. The Contemporary Art Scene in Tuscany: Theory and Practice
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 56. University of Florence Courses
OSPFLOR 58. Space as History: Urban Change and Social Vision: Florence 1059-2008
OSPFLOR 60. North/South in Contemporary Italy
OPPFLOR 61. Europe and U.S. Foreign Policy
OSPFLOR 62. Resistance: 1943-45
OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality and the Image
OSPFLOR 71. Becoming an Artist in Florence: The Contemporary Artistic Craftsmanship in Tuscany and the New Tendencies in the Visual Future
OSPFLOR 73. On the Way to Fascism
OSPFLOR 74. Italy in the Foreign Imaginary
OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon
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

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:
    ENGLISH 152D/PHIL 194L. W.E.B. DuBois as Writer and Philosopher
    ENGLISH 184L. Confessions: Writing and Reading the Self
    HUMTIES 197F/SLAVGEN 190/290. Tolstoy's *Anna Karenina* and the Social Thought of its Time
    PHIL 173A. Aesthetics: Metaphor across the Arts
    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/NS; 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 Director 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 advisor. 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.

DIGITAL HUMANITIES MODULE

The French and Italian department, in collaboration with the Humanities Lab, also offers a digital humanities module that can be combined with any of the department's major programs. Students who are interested in digital humanities should contact the department's Director of Undergraduate Studies who facilitates coordination with the Humanities Lab. Students planning to combine the French major and the digital humanities module must fulfill the following requirements in addition to the general major requirements:

1. CS 105 or equivalent
2. Participate in the Humanities Lab gateway core seminar, HUMNTIES 198J/ENGLISH 153H, Digital Humanities: Literature and Technology (5 units)
3. Complete the HUMNTIES 201, Digital Humanities Practicum (2-5 units), in the junior year
4. Complete one digital project, in lieu of the course's main writing requirement, in a course offered in the department under the supervision of the course instructor and humanities lab adviser. This should usually be done in an upper-division course.

Students are encouraged to enroll in DLCL 99, Multimedia Course Lab, when working on the digital course project. For more information on the Digital Humanities Lab, see http://shl.stanford.edu.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM IN FRENCH OR ITALIAN

Each year the department admits a small number of highly motivated 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 department chair and must include: a written statement of purpose, two letters of recommendation from faculty at Stanford, and a transcript. Students accepted into the coterminal program must have been undergraduate majors in the relevant language and must meet all requirements for the B.A. and the M.A.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN FRENCH AND ITALIAN

Admission to the M.A. and Ph.D. Programs—Applications and admissions information may be obtained from Graduate Admissions in the Registrar's Office, or 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.

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 Director 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. Knowledge of a second Romance language is desirable. Candidates for this degree are not eligible for financial aid or teaching assistantships.

DOCTOR OF PHILOSOPHY IN FRENCH, ITALIAN, OR 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. Requirements for each separate Ph.D. program are listed first, followed by general requirements. All requirements are binding.

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 rigorous training as scholars and as prospective university faculty.

Students admitted to the program work closely with the Director 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.

Language Requirements—Attaining a native or near-native fluency in French 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. 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 his or her adviser as a function of the student's area of specialization. Such proficiency may be demonstrated either by successfully completing a third-year level or above undergraduate course or, better, 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.

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.

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.

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 Director of Graduate Studies in structuring a plan consistent with their needs and interests. Where general requirements call for the participation of a Director of Graduate Studies, candidates for the Ph.D. in French and Italian should understand that the participation of the directors 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.

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 director of graduate studies, and the chair 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 orals—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.

GENERAL REQUIREMENTS FOR THE PH.D. IN FRENCH OR ITALIAN

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 Director of Graduate Studies.

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. Fellowship funding, teaching, and other requirements may be adjusted accordingly.

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. 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. Students must have passed the qualifying examination and satisfactorily completed at least 72 units of graduate-level study beyond the bachelor's degree (incompletes can not be counted). A candidacy form, available from the student services officer, should be completed, signed and approved the department.

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 may 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 week of October of the second year of study, tests the student's knowledge of language and literature. The examining committee (see below) will schedule 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.

The examining committee is determined yearly by the Department Chair.

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.

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 Director of Graduate Studies and department chair, 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 Director 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 Fall 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 Director 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 Director 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 Director 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 Director 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 Orals—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 will be 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 will be 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) will question 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 orals, only the certification of the final dissertation by the student's reading committee stands in the way of 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.

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 Director 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.

PH.D. IN FRENCH OR ITALIAN AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to the joint Ph.D. in French and Humanities, or Italian and Humanities. For a description of that program see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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 successful 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.

GERMAN STUDIES

Emeriti: (Professors) Theodore M. Andersson, Gerald Gillespie, Walter F. W. Lohnes, Katharina Mommsen, Kurt Müller-Vollmer*
Chair: Theodore M. Andersson
Director of Graduate Studies: Amir Eshel
Director of Undergraduate Studies: Márton Dornbach
Professors: Russell A. Berman, Elizabeth Bernhardt, Amir Eshel (on leave, Autumn), Orrin W. Robinson III (on leave, Spring)
Assistant Professors: Adrian Daub, Márton Dornbach, Charitini Douvaldzi (on leave)
Senior Lecturers: William E. Petig, Kathryn Strachota (on leave, Autumn)
Lecturers: Sarah Pourciau (Humanities Fellow), Shafiq Shamel
Visiting Assistant Professors: Wolf Dietrich Junghanns (Autumn), Markus Joch (Spring)
Affiliated Academic Staff: Henry Lowood (Curator, History of Science and Technology Collections and Film and Media Collection)

* recalled to active duty

Department Office: Building 260, Room 212
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 have the subject codes GERGEN and GERLIT. Courses in German General are listed in the "German General (GERGEN) Courses" section of this bulletin. Courses in German Literature are listed in the "German Literature (GERLIT) Courses" section of this bulletin. 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 the Ph.D. program in German Studies and Humanities, and 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.

UNDERGRADUATE PROGRAMS IN GERMAN STUDIES

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 their major Director 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 faculty adviser in the department.

COTERMINAL PROGRAMS

Students may elect to combine programs for the B.A. and M.A. degrees in German Studies. For details, see the "Undergraduate Degrees and Programs" section of this bulletin.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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 three courses at the 130-139 level (introductory surveys on topics in German literature, thought, linguistics, and culture). 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 Director 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.

Exceptions to any of these requirements must be referred to the Director of Undergraduate Studies who, in consultation with the Chair, 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 chairs of both departments. See the "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—

Three 130-139 courses:

- GERLIT 131. Goethe: Poetic Vision and Vocation in the Age of Reason
- GERLIT 131A. Immigrant/Minority Literature and Emergence of Multiculturalism in Germany
- GERLIT 136. Berlin Topographies in the Twentieth Century
- GERLIT 137. Introduction to German Poetry

One Writing in the Major course (WIM):

- GERLIT 137. Introduction to German Poetry (WIM)
- GERLIT 160. Interiors and Interiority in the Nineteenth Century (WIM)

Elective courses:

- GERGEN 61Q. Culture and conflict in contemporary Europe
- GERGEN 129/229. German Cinema
- GERGEN 144/244. Germanic Theologies
- GERGEN 148/248. A Brief History of Misogyny
- GERGEN 212/312. The Invention of Experience
- GERGEN 230. Truth in Art
- GERLIT 38A. Introduction to Germanic Languages
- GERLIT 121. Hanna Arendt
- GERLIT 127A. German Sports Movies
- GERLIT 147/247. The Avant Garde
- GERLIT 250A. Modern Drama
- GERLIT 250B. German Romanticism and Its Repercussions
- GERLIT 250C. Postwar German Culture and Thought: 1945-to the Present
- GERLIT 255. Middle High German

COGNATE COURSES

Credits earned for completion of the following cognate courses may be applied to unit requirements for the departmental major.

Autumn Quarter:

- RELIGST 278/378. Heidegger: Hermeneutics of the Self

Winter Quarter:

- CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent (Same as DRAMA 12N.)
- ENGLISH 140A. Creative Resistance

MUSIC 17N. Operas of Mozart
MUSIC 312A. Aesthetics and Criticism of Music, Ancients and Moderns: Plato to Nietzsche

Spring Quarter:
MUSIC 16N. Music, Myth, and Modernity: Wagner's Ring Cycle and Tolkien's *Lord of the Rings* (Same as GERLIT 16N.)
MUSIC 312B. Aesthetics and Criticism of Music, Contemporaries: Heidegger to Today
PHIL 125/225. Kant's First Critique

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. three courses at the 130 level
   b. a WIM course
2. GERGEN 181/PHIL 81, the gateway course in philosophy and literature, preferably in the sophomore year.
3. Requirements in Philosophy:
   a. PHIL 80. Prerequisite: introductory philosophy class
   b. a course in the PHIL 180 series
   c. a course in the PHIL 170 series
   d. 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 144/244, Germanic Theologies, GERLIT 250B, German Romanticism and its Repercussions, and other advanced seminars in German thought and literature. Students must consult with their advisers, the Director of Undergraduate Studies, and 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 director of Undergraduate Studies, and 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 Director 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.

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 100-129 level in either GERLANG or GERLIT, taught in German. Study at the Stanford in Berlin Center for at least one quarter is highly recommended.

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.

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.

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 9 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 chair, who passes it on for approval by the student's faculty adviser and a second reader appointed by the chair in consultation with the Director 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 chair. 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 will 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 thorough knowledge of the grammatical structure of German. The department expects Ph.D. candidates to demonstrate teaching proficiency in German; APPLLING 201, The Learning and Teaching of Second Languages is required. The teaching requirement is five quarters during the second and third years of study. The fifth and final quarter of teaching may be postponed until the student has worked extensively on the dissertation and may be devoted to a literary topic related to the dissertation. Such courses are subject to departmental review procedures.

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 at the colloquium for public discussion.

PH.D. IN GERMAN STUDIES AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to a Ph.D. degree in German Studies and Humanities. For a description of that program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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.

HISTORY

Emeriti: (Professors) 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, Rixford K. Snyder, Peter Stansky, David B. Tyack, Lyman P. Van Slyke; (*Senior Lecturer*) Joseph J. Corn
Chair: Paula Findlen
Professors: Keith M. Baker, Joel Beinin, Barton J. Bernstein, 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, Steven J. Zipperstein
Associate Professors: David R. Como, Zephyr Frank, Jessica Riskin, Matthew H. Sommer, Amir Weiner, Kären E. Wigen, Caroline Winterer
Assistant Professors: Robert Crews, James P. Daughton, Sean Hanretta, Allyson V. Hobbs, Aishwary Kumar, Kathryn Miller, Yumi Moon, Thomas S. Mullaney, Priya Satia, Laura Stokes, Jun Uchida
Professor (Teaching): Herbert Klein
Courtesy Professors: Giovanna Ceserani, Lawrence Friedman, Avner Greif, Amalia Kessler, Larry Kramer, Joseph Manning, Reviel Netz, Walter Scheidel, Sam Wineburg, Gavin Wright
Senior Lecturers: Katherine Jolluck, Martin W. Lewis
Acting Assistant Professors: James M. Ward, Huseyin Yilmaz
Lecturers: Alan Mikhail, Bradley Naranch, Edith Sheffer

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 have the subject code HISTORY, and are listed in the "History (HISTORY) Courses" section of this bulletin.

MISSION OF THE DEPARTMENT

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 influences 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.

DEGREES OFFERED

The Department of History offers the following degrees: Bachelor of Arts, coterminal Bachelor of Arts and Master of Arts, Master of Arts, and Doctor of Philosophy.

UNDERGRADUATE PROGRAMS IN HISTORY

BACHELOR OF ARTS IN HISTORY

Note: 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 2007-2008 edition of the *Course 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 1-199. (Winter/Spring IHUM History offerings are also allowed.) The choices for 2008-09 are:

IHUM 4A,B. Mass Violence from Crusades to Genocide
IHUM 6A,B. World History of Science
IHUM 11A,B. Origins of the World: Europe and Latin America
HISTORY 70. Culture, Politics and Society in Latin America
HISTORY 103E. History of Nuclear Weapons
HISTORY 104. Trials that Made History: Courtroom Martyrs and Villains from the Classical to the Modern Period
HISTORY 106A. Global Human Geography: Asia and Africa
HISTORY 106B. Global Human Geography: Europe and Americas
HISTORY 107. Introduction to Feminist Studies
HISTORY 110A. Europe from Late Antiquity to 1500
HISTORY 110C. Introduction to Modern Europe
HISTORY 120A. Foundations of Modern Russia
HISTORY 120B. The Russian Empire
HISTORY 125. Twentieth-Century Eastern Europe
HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe
HISTORY 132A. Enlightenment and the Arts
HISTORY 133B. Revolutionary England: The Stuart Age
HISTORY 136D. European Intellectual History, 1789-Present
HISTORY 137. The Holocaust
HISTORY 137A. Europe, 1945-2002
HISTORY 138A. Germany and the World Wars, 1870-1990
HISTORY 138B. Colonialism and Empire in Nineteenth-Century Europe
HISTORY 140A. The Scientific Revolution
HISTORY 145B. Africa in the Twentieth Century
HISTORY 150A. Colonial and Revolutionary America
HISTORY 150B. Nineteenth-Century America
HISTORY 150C. The United States in the Twentieth Century
HISTORY 151. Slavery and Freedom in American History
HISTORY 154A. Religion and American Society
HISTORY 163. A History of North American Wests
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
HISTORY 168. U.S. History since World War II through Film
HISTORY 170. Colonial Latin America
HISTORY 181B. The Middle East in the Twentieth Century
HISTORY 182. Medieval Islamic History, 600-1500
HISTORY 182A. The Ottoman Empire
HISTORY 193. Late Imperial China
HISTORY 194B. Japan in the Age of the Samurai
HISTORY 195. Modern Korean History
HISTORY 196. South Asian Modernity, 1750-1950: Politics, Culture, Ideas
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 (HISTORY 110A,B,C) or a United States survey course (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 pre-requisites 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 junior or 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. In Spring Quarter of the junior year, following consultation with faculty advisors, History majors are required to complete a departmental degree progress review and submit it to the History office.

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 a 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 will write a 20-25 page research essay. Original research 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 as well as a final draft) of the essay. Any student wishing to write an honors thesis must take the Research Seminar for Majors in his or her junior year and use it to begin work on the thesis; this work can take the place of a research essay.

HISTORY 209S. Research Seminar for Majors

HONORS PROGRAM

For a limited number of majors, the department offers a special program leading to 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 to 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 the 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) have a thesis advisor who is a member of the Stanford History faculty; (4) submit by the specified due date(s) a 65-page or longer 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.

Required Courses—

To be taken in the Junior Year:

HISTORY 299H. Junior Honors Colloquium
HISTORY 209S. Research Seminar for Majors

Note: 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 will be 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 2008-09, these courses are as follows:

Field I: Africa/Asia/Middle East—

HISTORY 48Q. South Africa: Contested Traditions
HISTORY 48S. South Africa for Whom? Nationalisms in Twentieth Century South Africa
HISTORY 49S. Slavery, Race and Society in Islamic Africa and the Middle East from the Seventh to the Twentieth Centuries
HISTORY 90Q. Buddhist Political and Social Theory
HISTORY 95N. Mapping the World: Cartography and the Modern Imagination
HISTORY 106A. Global Human Geography: Asia and Africa
HISTORY 145B. Africa in the Twentieth Century
HISTORY 181B. The Middle East in the 20th Century
HISTORY 182. Medieval Islamic History, 600-1500
HISTORY 182A. The Ottoman Empire
HISTORY 193. Late Imperial China
HISTORY 194B. Japan in the Age of the Samurai
HISTORY 195. Modern Korean History
HISTORY 196. South Asian Modernity, 1750-1950: Politics, Culture, Ideas
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 249. History without Documents
HISTORY 256. U.S.-China Relations: From the Opium War to Tiananmen
HISTORY 281A. Twentieth Century Iraq: A Political and Social History
HISTORY 281B. Modern Egypt
HISTORY 282. The United States and the Middle East since 1945
HISTORY 282A. State and Society in Modern Turkey
HISTORY 282C. Environmental History of the Middle East
HISTORY 282B. Islamic Thought and Culture in the Pre-modern Middle East, 800-1800
HISTORY 283. The New Global Economy, Oil, and Islamic Movements in the Middle East
HISTORY 287B. International Law and the Palestinian-Israeli Conflict
HISTORY 291D. Traitors and Collaborators in Colonial History
HISTORY 291E. Maps, Borders, and Conflict in East Asia
HISTORY 292. The Two Koreas
HISTORY 293B. Homosexuality in Historical and Comparative Perspective
HISTORY 293D. Empire and Cosmopolitanism: Traveling Ideas in Global Political Thought
HISTORY 294. Liberalism and Violence: A Conceptual History
HISTORY 295F. Race and Ethnicity in East Asia
HISTORY 295J. Chinese Women's History
HISTORY 296. Communism and Revolution in China
HISTORY 296E. Contentious Identities: The Formation of Race, Ethnicity, and Nationhood in Modern Japan
HISTORY 298A. International Law and the Palestinian-Israeli Conflict
CLASSHIS 105. History and Culture of Ancient Egypt
CLASSHIS 106. Life and Death in China's Late Antiquity
INTNLREL 206. Palestinian Nationalism, Past and Present

Field II: The Americas

HISTORY 36N: Gay Autobiography
HISTORY 38N. The Body
HISTORY 44N. The History of Women and Gender in Science, Medicine and Engineering
HISTORY 52N. The Harlem Renaissance
HISTORY 54N. African American Women's Lives
HISTORY 56S. Crime Waves and Panics in the U.S. from Reconstruction to the War on Terror
HISTORY 57S. Reconstructions: Nation Building in U.S. Foreign Policy, 1865-2009
HISTORY 70. Culture, Politics and Society in Latin America
HISTORY 103E. History of Nuclear Weapons
HISTORY 107. Introduction to Feminist Studies
HISTORY 150A. Colonial and Revolutionary America
HISTORY 150B. Nineteenth Century America
HISTORY 150C. The United States in the Twentieth Century
HISTORY 151. Slavery and Freedom in American History
HISTORY 154A. Religion and American Society
HISTORY 163. A History of North American Wests
HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle
HISTORY 168. U.S. History since World War II through Film
HISTORY 170. Colonial Latin America
HISTORY 201. Introduction to Public History in the U.S., Nineteenth Century to the Present

HISTORY 243K. Endangered Species
HISTORY 251G. Topics in Constitutional History
HISTORY 254. Popular Culture and American Nature
HISTORY 255B. Introduction to African and African American Studies
HISTORY 255D. Racial Identity in the American Imagination
HISTORY 256. U.S.-China Relations: From the Opium War to Tiananmen
HISTORY 258. History of Sexuality in the U.S.
HISTORY 260. California's Minority-Majority Cities
HISTORY 261. Race, Gender, and Class in Jim Crow America
HISTORY 264X. Chicana/o History
HISTORY 265. Writing Asian-American History
HISTORY 267E. Twentieth Century American Politics
HISTORY 268E. American Foreign Policy and International History, 1941-2009
HISTORY 273B. Latin American Societies: The Public and the Domestic Domain
HISTORY 274A. Representing Revolution: The Mexican Revolution in Cross-disciplinary Perspective
HISTORY 275F. Social Change in Latin America
HISTORY 279A. Visual and Urban Culture of Modern Latin America
AMSTUD 114N. Visions of the 1960s
AMSTUD 160. Perspectives on American Identity
AMSTUD 203A. Children in American History
AMSTUD 214. The American 1960s: Thought, Protest, and Culture
ECON 116. American Economic History
ECON 226. U.S. Economic History
HPS 156. History of Women and Medicine in the United States
IHUM 4B. Mass Violence from Crusades to Genocides
IHUM 11B. Origins of the World: Europe and Latin America
POLISCI 137R. Justice at Home and Abroad: Civil Rights in the 21st Century

Field III: Europe, Eastern Europe, and Russia
HISTORY 12N. The Early Roman Emperors: History, Biography, and Fiction
HISTORY 15S. Understanding Machiavelli: War, Women, and Politics
HISTORY 16S. Vikings, Crusaders, Kings: The Normans and the Expansion of Latin Christendom
HISTORY 18S. Mobility in France and the Self: People, Products, and Ideas in Motion
HISTORY 20Q. Russia in the Early Modern European Imagination
HISTORY 21S. Nationalism and Communism in Eastern Europe, 1944-1953
HISTORY 22N. Images and Practices of Violence in Early Modern Russian Art and Law
HISTORY 32S. Discipline and Dirt: Urban Environments and Social Control in Modern Britain, 1800-1900
HISTORY 33S. The France of Louis XIV
HISTORY 34N. The European Witch Hunts
HISTORY 35S. The Specter of Female Power: Harpies, Harlots, and Hysterics in Revolutionary France, 1770-1871
HISTORY 36N. Gay Autobiography
HISTORY 46N. Science and Magic
HISTORY 85S. Jews, Christians and Muslims in a Mediterranean Port City: Salonica, 1821-1945
HISTORY 103E. History of Nuclear Weapons
HISTORY 110A. Europe from Late Antiquity to 1500
HISTORY 110C. Introduction to Modern Europe
HISTORY 120A. Foundations of Modern Russia
HISTORY 120B. The Russian Empire
HISTORY 125. Twentieth Century Eastern Europe
HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe
HISTORY 132A. Enlightenment and the Arts
HISTORY 133B. Revolutionary England: The Stuart Age
HISTORY 136D. European Intellectual History, 1789-Present
HISTORY 137. The Holocaust
HISTORY 138A. Germany and the World Wars, 1870-1990
HISTORY 138B. Colonialism and Empire in Nineteenth Century Europe
HISTORY 140A. The Scientific Revolution
HISTORY 217A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
HISTORY 217B. Land of Three Religions: Medieval Spain
HISTORY 218A. Muslim Minorities in History
HISTORY 221B. The Woman Question in Modern Russia
HISTORY 223. Art and Ideas in Imperial Russia
HISTORY 227B. Imperialism, the Media, and the Public Sphere
HISTORY 229. Poles and Jews
HISTORY 230F. Self-Policing, Denunciation, and Surveillance in Modern Europe
HISTORY 232D. Rome: The City and the World, 1350-1750
HISTORY 233. Reformation, Political Culture and the Origins of the English Civil War
HISTORY 233B. Early Modern Sexualities
HISTORY 233G. Catholic Politics in Europe, 1789-1992
HISTORY 234A. Marie Antoinette on Trial
HISTORY 236A. Nationalism 1600 to the Present
HISTORY 238K. European Collaboration, Resistance, and Retribution, 1938-1948
HISTORY 243C. Eighteenth Century Colonial Science and Medicine
CLASSART 61. Introduction to Greek Archaeology
CLASSGEN 22N. Technologies of Civilization: Writing, Numbers, and Money
CLASSGEN 47. Hannibal
CLASSGEN 60. The Life and Death of a Roman City: Pompeii
CLASSGEN 66. Herodotus
CLASSHIS 60. The Romans
CLASSHIS 101. The Greeks
ECON 115. European Economic History
IHUM 4A,B. Mass Violence from Crusades to Genocides
IHUM 11A. Origins of the World: Europe and Latin America
OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850
REES 130. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries

Field IV: Pre-1700
HISTORY 12N. The Early Roman Emperors: History, Biography, and Fiction
HISTORY 15S. Understanding Machiavelli: War, Women, and Politics
HISTORY 16S. Vikings, Crusaders, Kings: The Normans and the Expansion of Latin Christendom
HISTORY 20Q. Russia in the Early Modern European Imagination
HISTORY 22N. Images and Practices of Violence in Early Modern Russian Art and Law
HISTORY 33S. The France of Louis XIV
HISTORY 34N. The European Witch Hunts
HISTORY 49S. Slavery, Race and Society in Islamic Africa and the Middle East from the Seventh to the Twentieth Centuries
HISTORY 110A. Europe from Late Antiquity to 1500
HISTORY 120A Foundations of Modern Russia
HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe
HISTORY 132A. Enlightenment and the Arts
HISTORY 133B. Revolutionary England: The Stuart Age
HISTORY 140A. The Scientific Revolution
HISTORY 182. Medieval Islamic History, 600-1500
HISTORY 193. Late Imperial China
HISTORY 194B. Japan in the Age of the Samurai
HISTORY 217A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
HISTORY 217B. Land of Three Religions: Medieval Spain
HISTORY 218A. Muslim Minorities in History
HISTORY 232D. Rome: The City and the World, 1350-1750
HISTORY 233. Reformation, Political Culture and the Origins of the English Civil War
HISTORY 233B. Early Modern Sexualities
HISTORY 249. History without Documents
HISTORY 282B. Islamic Thought and Culture in the Pre-modern Middle East, 800-1800
CLASSART 61. Introduction to Greek Archaeology
CLASSGEN 22N. Technologies of Civilization: Writing, Numbers, and Money

CLASSGEN 47. Hannibal
CLASSGEN 60. The Life and Death of a Roman City: Pompeii
CLASSGEN 66. Herodotus
CLASSHIS 60. The Romans
CLASSHIS 101. The Greeks
CLASSHIS 105. History and Culture of Ancient Egypt
CLASSHIS 106. Life and Death in China's Late Antiquity
CLASSHIS 133. Classical Seminar: Origins of Political Thought
CLASSHIS 137. Models of Democracy
IHUM 4A. Mass Violence from Crusades to Genocides
IHUM 6A. World History of Science
IHUM 11A. Origins of the World: Europe and Latin America
OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850

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 International System is a required course for students who select the International History concentration. This course is not offered in 2008-09.

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; 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 2008-09, these courses are:

HISTORY 12N. The Early Roman Emperors: History, Biography, and Fiction
HISTORY 15S. Understanding Machiavelli: War, Women, and Politics
HISTORY 20Q. Russia in the Early Modern European Imagination
HISTORY 33S. The France of Louis XIV
HISTORY 36N. Gay Autobiography
HISTORY 38N. The Body
HISTORY 52N. The Harlem Renaissance
HISTORY 54N. African American Women's Lives
HISTORY 70. Culture, Politics and Society in Latin America
HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe
HISTORY 136D. European Intellectual History, 1789-Present
HISTORY 154A. Religion and American Society
HISTORY 168. U.S. History since World War II through Film
HISTORY 223. Art and Ideas in Imperial Russia
HISTORY 232D. Rome: The City and the World, 1350-1750
HISTORY 234A. Marie Antoinette on Trial
HISTORY 254. Popular Culture and American Nature
HISTORY 255D. Racial Identity in the American Imagination
HISTORY 282B. Islamic Thought and Culture in the Pre-modern Middle East, 800-1800
AMSTUD 114N. Visions of the 1960s
AMSTUD 160. Perspectives on American Identity
AMSTUD 203A. Children in American History
AMSTUD 214. The American 1960s: Thought, Protest, and Culture
CLASSGEN 66. Herodotus
OSPOXFRD 15. British Architecture and the Renaissance, 1500-1850
OSPOXFRD 221Y. Art and Society in Britain

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, SCIENCE, AND MEDICINE

The History, 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 140A. The Scientific Revolution (formerly HISTORY 232F)

Methodological Cluster (three courses)—These History courses focus on the history of science, technology, and medicine. For 2008-2009, these courses are:

HISTORY 44N. The History of Women and Gender in Science, Medicine, and Engineering
HISTORY 46N. Science and Magic
HISTORY 242G. Representing the World: Maps, Statistics, and Photography
HISTORY 243C. Eighteenth Century Colonial Science and Medicine
HISTORY 243G. Tobacco and Health in World History
HISTORY 243K. Endangered Species
HPS 154. What is Science? Explaining Nature from Pythagoras to Popper
HPS 156. History of Women and Medicine in the United States
CLASSGEN 22. Technologies of Civilization: Writing, Numbers, and Money

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 US, one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources & 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 three History department courses that focus on issues of law in civil societies and five 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.

Gateway Course—There is no gateway course for this HIP. 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 2008-2009, these courses are:

CLASSHIS 137. Models of Democracy
HISTORY 104. Trials that Made History: Courtroom Martyrs and Villains from the Classical to Modern Period
HISTORY 208S. The Politics of Retrospective Justice
HISTORY 251G. Topics in Constitutional History
HISTORY 287B. International Law and the Palestinian-Israeli Conflict
HISTORY 352B. History of American Law (requires the permission of the Law School instructor)
IHUM 4A. Mass Violence from Crusades to Genocides
OSPMADRD26. Issues in European Law

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 US, one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources & 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:
SOC 118. Social Movements and Collective Action
SOC 137. Homelessness: Its Causes, Consequences, and Policy Solutions
POLISCI 133. Ethics and Politics In Public Service
POLISCI 141. Global Politics of Human Rights
AMSTUD 221. Public and Professional Service: Theories and Ethical Practice of Public and Community
ETHICSOC 144. Nongovernmental Organizations and Development in Poor Countries

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.

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. (*Note:* Students who complete a paid summer internship in lieu of one for academic credit will 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 will be in addition to that required for the Research Seminar for Majors.)

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 & 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 toward 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.

GRADUATE PROGRAMS IN HISTORY

The primary goal of Stanford's 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.

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 coterminal 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 9, 2008.

The coterminal B.A. and M.A. program is not declarable on Axess.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm/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 9, 2008.

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 9, 2008. 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 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 9, 2008.

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 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
   - 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)
- History of Science, Medicine, and Technology

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 to 1800
   - Middle East since 1800
   - Africa
   - 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

   a. 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.
   b. 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 participates in the Graduate Program in Humanities leading to a Ph.D. degree in History and Humanities. See the "Interdisciplinary Studies in Humanities" section of this bulletin.

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.

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 have the subject code HPS, and are listed in the "History and Philosophy of Science and Technology (HPS) Courses" section of this bulletin.

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. Our 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, we draw upon the multiple methods of our 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 a period 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; and 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.

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

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 41A. 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.

HPS 156. History of Women and Medicine in the United States
HISTORY 243G/343G. Tobacco Ad 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
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 165/265. Philosophy of Physics
PHIL 167A/267A. Philosophy of Biology
PHIL 167B/267B. Philosophy, Biology, and Behavior
PHIL 224. Kant's Philosophy of Physical Science
PHIL 360. Core Seminar in Philosophy of Science
PHIL 365. Seminar in Philosophy of Science: Time

ADVANCED HISTORICAL PERSPECTIVES ON SCIENCE

The following courses focus on specific episodes in or approaches to the history of science.

HPS 154. What is Science? Explaining Nature from Pythagoras to Popper
FRENGEN 295. Science, Technology, and Society in Europe and the U.S.: Ethical Debates and Controversies
HISTORY 208A/308A. Science and the Law in History
HISTORY 232F/332F. The Scientific Revolution
HISTORY 241F/341F. History of the Modern Fact
HISTORY 241G/341G/STS 134/234. History of the Senses
HISTORY 241S. Science and Culture Wars

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 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

HUMAN BIOLOGY

Emeriti: (Professors) Clifford Barnett (Anthropological Sciences), Luigi Cavalli-Sforza (Genetics), Carl Djerassi (Chemistry), Sanford Dornbusch (Sociology), Albert H. Hastorf (Psychology), Dale Kaiser (Biochemistry), Herant Katchadourian (Human Biology), Donald Kennedy (Biology), Carol Winograd (Medicine), *(Associate Director)* Shirley Feldman
Director: Carol Boggs (Biology)
Associate Director: Katherine Preston
Professors: Laurence Baker (Health Research & Policy), William H. Durham (Anthropology), Russell D. Fernald (Biology), Uta Francke (Genetics), Margaret Fuller (Developmental Biology), Lawrence H. Goulder (Economics), H. Craig Heller (Biology), Richard Klein (Biology), Tanya Luhrmann (Anthropology), Michael Marmor (Ophthalmology), Gordon Matheson (Orthopedic Surgery), Roeland Nusse (Developmental Biology), Natalie Rasgon (Psychiatry and Behavioral Sciences), Thomas Robinson (Pediatrics, Medicine), Robert Sapolsky (Biology), Stephen Schneider (Biology), Matthew Scott (Developmental Biology), William Talbot (Developmental Biology), Shripad Tuljapurkar (Biology), Irving Weissman (Pathology), Jeffrey Wine (Psychology), Paul Wise (Pediatrics), Arthur B. Wolf (Anthropology)
Associate Professors: Firdaus Dhabhar (Psychiatry and Behavioral Sciences), Anne Fernald (Psychology), Paul Fisher (Neurology and Neurological Sciences, Pediatrics), James Fox (Anthropology), John Rick (Anthropology), Randall Stafford (Medicine)
Assistant Professors: Melissa Brown (Anthropology), David DeGusta (Anthropology), James H. Jones (Anthropology), Norman G. Miller (Medicine), Michael Ramscar (Psychology)
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): Eunice Rodriguez (Pediatrics), Donald Barr (Sociology), Catherine Heaney (Psychology, Medicine), David Magnus (Pediatrics), Robert Siegel (Microbiology and Immunology)
Clinical Professor: Laraine Zappert (Psychiatry and Behavioral Sciences)
Clinical Assistant Professors: Daniel Garza (Orthopedic Surgery, Emergency Medicine), Mary Therese Jacobson (Obstetrics and Gynecology)
Other Teaching Faculty and Staff: William Abrams, Wesley F. Alles (Medicine), Judy Chu, Gerda Endemann (Biology), Anne Firth-Murray, Anne Friedlander (Stanford Center on Longevity), Renu Heller, Michaela Kiernan (Medicine), Nicole Dudukovic Kuhl, Michael Mastrandrea (Earth Sciences), Lisa Medoff, Lynn Rothschild, Norman Ruby (Biology), Merritt Ruhlen (Anthropology), Darvin Scott Smith (Microbiology and Immunology), James Truncer (Anthropology), Katherine E. Williams (Psychiatry and Behavioral Sciences), Jennifer Wolf (Education), Nathan Wolfe, Larry Zaroff (Anesthesiology, Biomedical Ethics)
Course Associates: Tom McFadden, Lindsey Merrihew, Isabel Shelton-Mottsmith, Marci Pepper, Will Peterson, Aimee Precourt, Helen Snodgrass, Michelle Wilson
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 have the subject code HUMBIO, and are listed in the "Human Biology (HUMBIO) Courses" section of this bulletin.

The Program in Human Biology is an interschool, interdepartmental, undergraduate major. The program's mission is to provide an interdisciplinary approach to understanding the human being from biological, behavioral, social, and cultural perspectives.

The program seeks: (a) to provide a broad and rigorous introduction to the biological and behavioral sciences and their interrelationships, and (b) to explore how this knowledge, in conjunction with studies in other fields, can be applied to formulate and evaluate health, environmental, and other public policies that influence human welfare. 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 roadmap 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.

UNDERGRADUATE PROGRAMS IN HUMAN BIOLOGY

The program offers a Bachelor of Arts in Human Biology, as well as a minor and an honors program.

STUDENT ADVISERS

Human Biology has an advising program comprising faculty and student advisers. Before declaring Human Biology as their undergraduate major, each student must meet with one of six student advisers who assist them in developing a coherent study plan based on an individualized area of concentration, and the selection of foundation, concentration, and upper-division courses. They 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, the Advising Extravaganza, 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

The B.A. in Human Biology (HUMBIO) requires a minimum of 84 units in the major divided among four levels of courses:

1. *Fundamental Program*: at least 38 units, to include
   Human Biology Core (30 units)
   Statistics (4-5 units)
   Internship (HUMBIO 197; 4 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. 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. 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. A maximum of 10 premed units (from the chemistry, physics, and calculus series, and biology lab courses) are allowed. 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/231.

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, including those listed as cognate courses from another department. A list of Human Biology cognate courses can be found at http://www.stanford.edu/dept/humbio/cgi-bin/?q=node/1382.

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 by the end of Spring Quarter of the sophomore year, but not later than the end of Autumn Quarter of the junior year; students must petition the director to declare later than 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.

HUMAN BIOLOGY CORE

Required core sequences (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.

For academic year 2008-09, 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 affords 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 once 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 resources in the Human Biology office including the *Human Biology Honors Handbook,* the honors program application available from the student services office, and appointments during office hours with the Human Biology honors chair. Courses of interest to honors students include: HUMBIO 193, Research in Human Biology, and HUMBIO 194, Honors. 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. Each honors student then presents a brief summary of honors 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 we know of the biological with an understanding of the social and cultural setting in which they exist. Students with a minor in Human Biology will have a strong background in the integration between the biological and social aspects of humans. 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 course offering by Human Biology numbered 100-189). These must be taken for a minimum letter grade of 'C-'. Courses that count towards the fulfillment of major requirements may not be counted towards the minor. 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).

STOREY HOUSE

Storey House, 544 Lasuen Mall, is an undergraduate residence for the Human Biology Academic Theme House, 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.

INDIVIDUALLY DESIGNED MAJORS

The Individually Designed Major program (IDM) is overseen by the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. See the "School of Engineering" section of this bulletin for information about the IDM in Engineering.

The program is intended for currently registered undergraduates in good academic standing interested in pursuing an area of scholarly inquiry that falls outside the purview of an established academic department or program of the University. Proposals for the IDM should be intellectually coherent majors designed by the students themselves with the assistance of faculty members of their choice. The primary adviser must be an Academic Council member. The IDM major requires a minimum of 75 units, all in courses at or above the 100 level, and a minimum GPA of 3.5. The proposed major must not duplicate or be achievable through a major 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. The application deadline for IDM proposals is the fifth week of Spring Quarter of the sophomore year. Applications are reviewed only once a year. Detailed 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, Building 1. An IDM cannot be a student's secondary major.

INTERDISCIPLINARY STUDIES IN HUMANITIES

Director: Gregory Freidin
Program Coordinator: Alice Staveley
Steering Committee: (Chair) Gregory Freidin (Slavic Languages and Literatures), Lanier Anderson (Philosophy), Jean-Marie Apostolidès (French and Italian, Drama), Keith Baker (History), Vincent Barletta (Spanish and Portuguese), Helen Brooks (English, Interdisciplinary Studies in Humanities), Márton Dornbach (German Studies), Al Duncan (Graduate Program in Humanities student representative), Thomas S. Grey (Music), Blair Hoxby (English), Branislav Jakovljevic (Drama), Joshua Landy (French and Italian, on leave), Steven G. Lee (Graduate Program in Humanities student representative), Pavle Levi (Art and Art History, on leave), Hilton Obenzinger (English, VPUE), Conner Peretti (Humanities Honors Program student representative), Rush Rehm (Drama, Classics,on leave Autumn), Brent Sockness (Religious Studies), Alice Staveley (English, Interdisciplinary Studies in Humanities), Carlyn Sylvester (Humanities Honors Program student representative)

Department Offices: Building 240
Mail Code: 94305-2022
Department Phone: (650) 723-3413
Email: idstudies.moore@stanford.edu
Web Site: http://www.stanford.edu/group/HSP/GPH

Courses offered by the Program in Interdisciplinary Studies in Humanities have the subject code HUMNTIES, and are listed in the "Interdisciplinary Studies in Humanities (HUMNTIES) Courses" section of this bulletin.

Humanities, including humanistic social sciences, concern themselves with human cultures, their histories and varieties of cultural expression, and the analysis of these phenomena. At the basis of the humanities is the awareness of the tradition of humanistic discourse, its arts and letters, philosophical and social thought, and major texts from ancient to modern times. Students in the program are introduced to foundational works in their historical context from the perspective of disciplines such as literary and historical studies including cultural, intellectual, social, and art history, philosophy, religious studies, and the humanistic social sciences. The program's mission is to help students locate their disciplinary perspectives and subject matter within the humanistic tradition at large, to provide them with mentoring and advising, and to make available to them a community of peers pursuing similar interests regardless of disciplinary concentrations.

Interdisciplinary Studies in Humanities is responsible for the following programs:

1. Honors Program in Humanities
2. Interdisciplinary Major in Humanities
   a. Interdisciplinary Major
   b. Interdisciplinary Major for Premeds
   c. Interdisciplinary Major in Digital Humanities
   d. Interdisciplinary Major in Philosophical and Literary Thought
3. Graduate Program in Humanities
   a. Master of Arts
   b. Doctor of Philosophy

   The following programs share the administrative facilities with Interdisciplinary Studies in Humanities:
4. American Studies (see the "American Studies" section of this bulletin)
5. Medieval Studies (see the "Medieval Studies" section of this bulletin)
6. Program in Modern Thought and Literature (see the "Modern Thought and Literature" section of this bulletin)

UNDERGRADUATE PROGRAMS IN HUMANITIES

To declare the major in Humanities, a student must first have been accepted into the Humanities Honors Program. See the "Bachelor of Arts in Interdisciplinary Studies in Humanities" section below for details of the Humanities Honors Program.

BACHELOR OF ARTS IN INTERDISCIPLINARY STUDIES IN HUMANITIES

THE MAJOR IN INTERDISCIPLINARY STUDIES IN HUMANITIES

A student who is a member of the Humanities Honors Program may choose to pursue the B.A. degree in Humanities through one of four concentration options: (1) the standard student designed thematic concentration; (2) the concentration designed for students who also plan to complete the established premedical curriculum for careers in the health sciences; (3) the concentration in digital humanities; or (4) the concentration in philosophical and literary thought. For all options, the B.A. degree conferred is in Humanities. Each student chooses a field that reflects the focus of study, which is noted on the transcript after degree conferral. Students who complete a thesis with a grade of 'B' or higher receive Honors in Humanities, which is noted on the transcript and on the diploma. More detailed information may be found in the Procedures and Guidelines documents, available at the program office. Admission information and recommended academic schedule follow below.

Each applicant to the major submits a study plan and statement of purpose which outlines the rationale for a particular field of study. The study plan should be worked out in consultation with the student's faculty mentor. Students who wish to major in Humanities must apply to the major by the end of the sophomore year.

Students may complete fields of study in the following; these fields are declared on Axess and appear on the transcript but not on the diploma.

1. Culture and Politics
2. Digital Humanities (see below)
3. Early Modern Studies
4. Film, Literature, and Society
5. Medieval Studies
6. Modern Thought and Literature
7. Performance, Culture, and Society
8. Philosophical and Literary Thought (see below)
9. Philosophy and the Visual Arts
10. Philosophy, Literature, and Ecology

REQUIREMENTS FOR THE MAJOR

Majors must first enroll in the Humanities Honors Program. With the exception of the premed option, each program of study must include at least 12 courses for a minimum of 60 units over and

above the requirements of the Humanities honors program (28-30 units). In order to count toward the major, courses must be at least three units, must be at the 100 level or above, and must be taken for a letter grade.

INTERDISCIPLINARY MAJOR AND RECOMMENDED ACADEMIC SCHEDULE

The program of study for the thematic concentration includes:

1. A statement of purpose designating the field and outlining the rationale for the program of study.
2. Six courses in one of the three areas: literary, historical, or philosophical study.
3. Three courses in each of the other two areas above.
4. The requirements for the Humanities honors program.

If additional courses are needed to make up the 60 unit minimum, the student may take those courses in any of the three categories. Each program of study must be signed by a Stanford faculty member who has agreed to act as the student's academic adviser; the proposed program must then be approved by the director. Changes in the study plan must be approved by the student's adviser and kept on file in the program office.

For some fields of study, such as film studies or modern thought and literature, specific courses or types of courses may be recommended. Consult the student handbook for such recommendations.

INTERDISCIPLINARY MAJOR FOR PREMEDS

The Interdisciplinary Major in Humanities offers an option for students who are preparing to attend medical school, but who wish to focus their studies in the humanities. This program of study gives students a coherent way to organize interdisciplinary interests by theme, nationality, or historical period. In addition, students choosing this track take all the courses usually required by medical schools (two years of organic and inorganic chemistry with labs, one year of physics, one year of biology with labs, and one or two courses to provide proficiency in quantitative skills as determined by a premed adviser), as well as course work in various humanities disciplines (eight courses and a minimum of 40 units) distributed as follows:

1. A statement of purpose choosing one of the fields listed above.
2. Four courses in the student's chosen field. Generally these four courses address different aspects of literature, history, and philosophy.
3. Three courses in medical ethics, history or philosophy of science, or science and the humanities.
4. One course in the arts.
5. The courses recommended by Undergraduate Advising and Research to fulfill medical school entrance requirements.
6. The requirements for the Humanities honors program.

INTERDISCIPLINARY MAJOR IN DIGITAL HUMANITIES

The development of new technologies has produced new topics for scholarly discussion in the humanities as well as new forms of cultural expression. The Interdisciplinary Major in Humanities offers a field of study for students who wish to concentrate study in the Digital Humanities with the following course requirements:

1. A statement of purpose outlining a narrowly defined field of study and approved by a digital humanities adviser.
2. HUMNTIES 198 as one of the core seminars for the Humanities honors program.
3. CS 105, Introduction to Computers, or CS 106A, Programming Methodology, or equivalent.
4. Seven humanities courses relevant to the student's focus as articulated in the statement of purpose.
5. Three computer science or technology courses relevant to the student's focus; one course should have a technical focus, and one should deal with societal issues.
6. HUMNTIES 201, Digital Humanities Practicum, in preparation for the student's honors project.
7. The requirements for the Humanities honors program.

INTERDISCIPLINARY MAJOR IN PHILOSOPHICAL AND LITERARY THOUGHT

The field of study in philosophical and literary thought is available in association with the crossdisciplinary Program for the Study of Philosophical and Literary Thought. Students wishing to major in Humanities with this focus must consult with the director of that program, as well as the director of Interdisciplinary Studies in Humanities. Students prepare a program of study including at least 12 courses in literary, philosophical, and historical study, of which six courses are in philosophical or literary thought, and three in each of the other two categories. Requirements:

1. A statement of purpose defining a focus in philosophical or literary thought.
2. HUMNTIES 181, Philosophy and Literature Gateway, which can be counted toward the course requirements for philosophical study or toward the requirements for literary study.
3. PHIL 80, Mind, Matter, and Meaning.
4. Courses in philosophical study normally include at least one course from the PHIL 170 sequence and one course from the PHIL 180 sequence.
5. Courses in literary study should focus on one national literature.
6. Courses in historical study should include at least one course in the history of philosophy.
7. The requirements of the Humanities honors program.
8. Students in this track are strongly encouraged, where possible, to select one or two Interdisciplinary Core Seminars which are approved as courses of special relevance for philosophical and literary thought.

Interested students should consult the director of undergraduate studies in the Program for the Study of Philosophical and Literary Thought for a listing of courses of special relevance to the study of philosophy and literature (which includes some of the HUMNTIES interdisciplinary core seminars).

HONORS PROGRAM

The Honors Program in Humanities aims to heighten a sense of the relations among various humanistic disciplines, and to study issues in intellectual and cultural history through aesthetic, literary, historical, religious, social, and ethical perspectives.

ADMISSION

Any qualified undergraduate at Stanford, regardless of major, may apply to the Humanities Honors Program. Interested students may obtain information from the program office. Students are encouraged to register for the program at the earliest opportunity and to take HUMNTIES 100, Text and Context in Humanities, in the sophomore year. However, students may join the program as late as the junior year under certain circumstances such as in the case of transfer students. Students enrolled in the crossdisciplinary majors affiliated with the Program for the Study of Philosophical and Literary Thought, whether through the Philosophy major or one of the literature majors, are encouraged to write their honors essays through the Humanities honors program. Students must meet the following entrance requirements before being admitted to the program:

1. Completion of at least two quarters of the Area One requirement, except in the case of transfer students, who are granted an exception.
2. A grade point average (GPA) of at least 3.3 (B+) in all course work in the humanities. Such course work includes any Area One sequence and all Program in Writing and Rhetoric sections; all courses in the departments of Art and Art History, Drama, and Music (except studio or performance courses); all courses in the departments of Asian Languages, Classics, English, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese (except first-year language courses); all courses in the departments of Comparative Literature, History, Philosophy, and Religious Studies; and all courses in the programs in Feminist Studies and Modern Thought and Literature.

REQUIREMENTS

1. Completion of HUMNTIES 100, Text and Context in Humanities, 3 units, preferably in the sophomore year.
2. Two different seminars in the series 160-163 or 190-198: 8-10 units, sophomore or junior year. Both seminars must be completed by the end of the tenth quarter of undergraduate study in order for students to remain members in good standing.
3. At least one survey course in intellectual or cultural history, 4-5 units, in a field relevant to the anticipated topic of the senior essay, choosing from the 160-163 series or among courses in history, philosophy, religious studies, literature, and the arts. Students should consult the course list in the program office.

4. In order to develop the requisite knowledge and methodological background to write a Humanities honors essay, students must take, during their sophomore and junior years, the required Humanities honors courses and additional humanities courses in disciplines germane to their honors essays.
5. Enrollment in 200A, one unit each, Winter and Spring quarters of the junior year.
6. Enrollment in 199A,B Honors Essay Writing Workshop, one unit each.
7. Completing an honors essay on a topic approved by the Steering Committee (usually 5 units Autumn Quarter and 5 units Winter Quarter, senior year).
8. A minimum GPA of 3.3 (B+) in all courses taken for the Honors Program, as well as an overall minimum GPA of 3.0 (B) in all course work in order to remain in the program.

GRADUATE PROGRAMS IN INTERDISCIPLINARY STUDIES INHUMANITIES

University requirements for the M.A. and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

MASTER OF ARTS IN HUMANITIES

The Master of Arts program within the Graduate Program in Humanities is designed to broaden the student's academic background and cultural knowledge through a series of seminars that study intellectual history from the classical period to the modern era. Students gain added depth by taking four advanced courses within a defined field of study.

Application is made through the Interdisciplinary Studies in Humanities office. Application procedures and deadlines are available on the web at http://gradadmissions.stanford.edu. The M.A. program in Humanities is ideally completed as a half-time, two-year program, but under some circumstances it may be completed in one year as a full-time program. The program does not offer financial aid for the master's program.

REQUIREMENTS

1. Complete graduate-level course work in the five required areas: classical age, the middle ages, Renaissance and early modern period, the Enlightenment, and modernity, with at least three of the five areas to be covered by the GPH seminars (321-325). The remaining two may be covered by GPH seminars or, by petition, by courses in the student's approved concentration (see below).
2. Complete four graduate-level courses in an approved concentration to be determined in consultation with the director. At least one of these must be a graduate-level research seminar for which a research paper is required. Under "Statement of Purpose" on the application form, the candidate must indicate the field of study (for example, art history, early modern studies, philosophy, etc.) from which the graduate-level courses are drawn. The candidate must also note his or her qualifications for undertaking graduate study in that designated field. Once admitted, the student submits a proposed program of study to the director, specifying the particular courses to be taken. The proposed program is approved on its own merits to ensure that the chosen graduate courses are suited to the M.A. in Humanities.
3. Enrollment and participation in HUMNTIES 301, The Graduate Student and Faculty Colloquium, during all quarters of study toward the M.A.
4. Complete HUMNTIES 298, Graduate Program in Humanities Symposium, Spring Quarter. Prior completion of the Symposium Paper may be substituted with special consent.

The minimum number of units for the M.A. degree is 45. Additional elective units may be taken at the option of the student.

Undergraduates wishing to pursue the M.A. as part of a coterminal program should speak with the program administrator about the application procedures for coterminal students.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

DOCTOR OF PHILOSOPHY IN HUMANITIES

The Graduate Program in Humanities (GPH) provides graduate students in different disciplines an opportunity to broaden their knowledge of intellectual and cultural history by focusing on texts and ideas which have been central to all humanistic disciplines from the ancient world to the present. The program's seminars usually focus on specific topics or issues in the context of historical, literary, philosophical, religious, and other disciplinary and theoretical orientations. The program provides a unique opportunity to study highly influential texts with a view to their relevance to the student's own disciplinary field.

GPH members must be students earning the Ph.D. in an academic department at Stanford. Doctoral students who complete the requirements for their departments and the GPH are awarded doctoral degrees designating their primary department "and Humanities."

Students may register for the program at any time, usually during the first quarter of graduate study. Members of the program are given first preference in registration for all of its offerings. Students complete the five GPH seminars (HUMNTIES 321-325). The course of study culminates in the GPH student symposium, which is developed and organized by the students in the program.

Although students in the GPH generally complete the program course work in their first two years of graduate study, requirements of some participating departments may necessitate completion of the GPH over three years. In some instances, one or more of the GPH seminars may fit within the requirements of the student's home department.

The following are participating departments in the program: Art and Art History, Classics, Comparative Literature, Drama, Education, English, French and Italian, German Studies, History, Modern Thought and Literature, Music, Philosophy, Religious Studies, Slavic Languages and Literatures, and Spanish and Portuguese. Doctoral students from other departments may participate with consent of their home departments and approval of the Director of Interdisciplinary Studies in Humanities.

REQUIREMENTS

Continue satisfactory work in the student's major field, in accordance with department requirements.

1. Complete graduate-level course work in the five required areas: classical age, the middle ages, Renaissance and early modern period, the Enlightenment, and modernity, with at least three of the five areas to be covered by the GPH Seminars (HUMNTIES 321-325). The remaining two may be covered by GPH seminars or, by petition, by courses in the student's Ph.D. program or cognate field.
2. Enrollment and participation in HUMNTIES 301, The Graduate Student and Faculty Colloquium, during the quarters the student is enrolled in the required seminars, up through completion of the symposium requirement.
3. Participate in the GPH student symposium, usually at the end of the second year of GPH course work (HUMNTIES 298; registration for units is optional).
4. One quarter of interdisciplinary teaching. Students may apply to TA an undergraduate Humanities course, or may petition to count a departmental teaching assistantship if the course reaches beyond the scope of a single discipline.
5. Reading knowledge of at least one foreign language, ancient or modern, to be certified in the first two years of graduate work.
6. Passing the University oral examination according to the schedule prescribed by the major department with one GPH representative, approved by the director, as a member of the examining committee.
7. Submission of a Ph.D. dissertation acceptable to a committee which includes one representative of the GPH, approved by the director.

DIVISION OF INTERNATIONAL COMPARATIVE AND AREA STUDIES

Director: Andrew Walder
Advisory Committee: Keith Baker (History), Judith Goldstein (Political Science), Robert Gregg (Religious Studies), Stephen Haber (Political Science), Nicholas Hope (Stanford Institute for Economic Policy Research), Ian Morris (Classics)
Directors' Committee: Keith Baker (History), Carl Bielefeldt (Religious Studies), Philippe Buc (History), John Dunlop (Hoover Institution), Charlotte Fonrobert (Religious Studies), Robert Gregg (Religious Studies), Linda Hess (Religious Studies), Herbert Klein (History), Anjini Kochar (Stanford Institute for Economic Policy Research), Abbas Milani (Hoover), Richard Roberts (History), Aron Rodrigue (History), Kenneth Schultz (Political Science), Vered Shemtov (Language Center), Stephen J. Stedman (Freeman Spogli Institute for International Studies), Chao Fen Sun (Asian Languages), Andrew Walder (Sociology), Amir Weiner (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*; Center for Latin American Studies*; France-Stanford Center for Interdisciplinary Studies; Center for Russian, East European and Eurasian Studies*; Ford Dorsey Program in International Policy Studies*; International Relations*; Mediterranean Studies Forum; Hamid and Christina Moghadam Program in Iranian Studies; Robert H. N. Ho Family Foundation Center for Buddhist Studies at Stanford University; Sohaib and Sara Abbasi Program in Islamic Studies; Taube Center for Jewish Studies*; Center for European Studies; and the Center for South Asian 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 certificate, and a Master of Arts (M.A.) degree. For further information, see the "African Studies" section of this bulletin.

ROBERT H. N. HO FAMILY FOUNDATION CENTER FOR BUDDHIST STUDIES AT STANFORD

Director: Carl Bielefeldt
Office: Encina Commons
Web Site: http://scbs.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.

CENTER FOR EAST ASIAN STUDIES

Director: Chao Fen Sun
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 bachelor's and master's degree programs. 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.

CENTER FOR EUROPEAN STUDIES

Directors: Philippe Buc, Amir Weiner
Office: Encina Hall West, second floor
Web Site: http://europeanstudies.stanford.edu

The Center for European Studies is a multidisciplinary institute committed to the examination of European society, culture, politics, diplomacy, and security. The center's goal is to develop Stanford's contribution to the study of Europe's history and contemporary position as a global power by bringing together students and scholars from the humanities and the social sciences, policy makers, diplomats, and journalists. The center sponsors visiting professors, intellectuals, and personalities from Europe. Besides research, an important side-product of these exchanges is the development of Stanford undergraduate and graduate courses on themes related to European history, culture, and current events.

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.

FORD DORSEY PROGRAM IN INTERNATIONAL POLICY STUDIES

Director: Stephen J. Stedman
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 Studies" section of this bulletin.

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.

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.

SOHAIB AND SARA ABBASI PROGRAM IN ISLAMIC STUDIES

Director: Robert Gregg
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
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.

CENTER FOR LATIN AMERICAN STUDIES

Director: Herbert S. Klein
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 certification for undergraduates, and a master's degree.

For further information, see the "Center for Latin American Studies" section of this bulletin.

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 N. 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.

CENTER FOR RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

Director: John Dunlop
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 ASIAN STUDIES

Directors: Linda Hess, Anjini Kochar
Office: Encina Hall West, second floor
Web Site: http://southasia.stanford.edu

The Center for South Asian Studies 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.

INTERNATIONAL POLICY STUDIES

Director: Stephen J. Stedman (Freeman Spogli Institute for International Studies)
Executive Committee Co-chairs: Coit D. Blacker (Freeman Spogli Institute for International Studies), Judith L. Goldstein (Political Science)
Executive Committee: Jenny Martinez (School of Law), Michael McFaul (Political Science), Rosamond Naylor (Freeman Spogli Institute for International Studies), Norman Naimark (History), Bruce Owen (Public Policy), Julie Parsonnet (School of Medicine), Nicholas C. Hope (Stanford Institute for Economic Policy Research), David Victor (Freeman Spogli Institute for International Studies)
Lecturers: Chonira Aturupane, Erica Gould, Keith Hansen, Eric Morris, Tom O'Keefe, Kirsten Oleson, Asta Sendonaris, Mary Sprague
Affiliated Faculty: Mike Armacost (Freeman Spogli Institute for International Studies), Jonathan Bendor (Business), Byron Bland (Freeman Spogli Institute for International Studies), Paul Brest (Law), Jeremy Bulow (Economics), Gordon Chang (History), John Cogan (Hoover Institution), 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), David J. Holloway (History, Political Science), Simon Jackman (Political Science), Timothy Josling (Freeman Spogli Institute for International Studies), Terry Karl (Political Science), Daniel P. Kessler (Graduate School of Business), Stephen D. Krasner (Political Science), Gail Lapidus (Freeman Spogli Institute for International Studies), Susanna Loeb (Education), Michael McFaul (Political Science), 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), Debra Satz (Philosophy), Jeff Strnad (Law), Michael Tomz (Political Science), David Victor (Freeman Spogli Institutute for International Studies), Andrew Walder (Sociology), Jeremy Weinstein (Political Science), Allen Weiner (Law)

Program Office: Encina Hall West, Room 216
Mail Code: 94305-6045
Phone: (650) 725-9155
Web Site: http://ips.stanford.edu

Courses offered by the Program in International Policy Studies have the subject code IPS, and are listed in the "International Policy Studies (IPS) Courses" section of this bulletin.

GRADUATE PROGRAM IN INTERDISCIPLINARY POLICY STUDIES

MASTER OF ARTS IN INTERNATIONAL POLICY STUDIES

International Policy Studies (IPS) is an analytical interdisciplinary program focusing on international policy analysis. Its goal is to provide students with exposure to issues that they face in international business and public policy, and to develop skills and knowledge to address those issues. The program allows students to specialize in: international political economy; international negotiation and conflict management; international security and cooperation; democracy, development, and the rule of law; global health; global justice; or energy, environment, and resources.

IPS requires completion of the core and concentration requirements, which amount to 90 units of credit. Additional units are required for students who have not fulfilled prerequisites for these requirements.

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 a strong undergraduate background in economics and political science. To enroll in the program, students must have taken calculus-based undergraduate courses in statistics, microeconomics, and macroeconomics. Stanford courses satisfying these requirements are ECON 51, 52, and ECON 102A or POLISCI 150A. In addition, students must have completed one advanced undergraduate course in international economics; the Stanford course that meets this requirement is ECON 165.

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 ten pages; an area of concentration form; and resume. 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 or for information on graduate admission, see http://gradadmissions.stanford.edu. 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 6, 2009.

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 completion 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 ten pages, and a statement of relevant personal, academic, and career plans and goals. Applications must be filed together with supporting materials by January 6.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

DEGREE REQUIREMENTS

To receive the M.A. degree in International Policy Studies, students must complete the items below. These requirements entail 4 units of core courses, 36 units of policy skills, a 10-unit practicum, a 5-unit writing and rhetoric seminar, a 5-unit course in international economics, and an additional 30 units from the concentration curriculum. These courses have the following prerequisites: ECON 51, 52, 102A or POLISCI 150A, and ECON 165.

Core Courses—

1. IPS 300. Public Policy Colloquium (1 unit)
2. IPS 201. Managing Global Complexity (3 units)

Policy Skills—

1. IPS 204A. Microeconomics (4 units)
2. IPS 204B. Cost-Benefit Analysis and Evaluation (4 units)
3. IPS 205A. Principles of Research Design and Analysis: Methods (4 units)
4. IPS 205B. Principles of Research Design and Analysis: Tools (2 units)
5. IPS 205C. Foundations of Statistical Inference (2 units)
6. IPS 206A. Politics and Collective Action (4 units)
7. IPS 206B. Organizations (4 units)
8. IPS 207A. Judgment and Decision Making (4 units)
9. IPS 207B. Public Policy and Social Psychology: Implications and Applications (4 units)
10. IPS 208. Justice (4 units)

Writing and Rhetoric Seminar—One of the following (5 units):

1. IPS 210. Politics of International Humanitarianism
2. IPS 211. The Transition from War to Peace: Peacebuilding Strategies
3. IPS 212. Issues in Development
4. IPS 219. Roles of Intelligence in U.S. Foreign Policy
5. IPS 314S. Decision Making in U.S. Foreign Policy

International Economics—IPS 202, Topics in International Macroeconomics; or IPS 203, Issues in International Economics (5 units)

Practicum—IPS 209, Practicum (10 units)

Concentration Curriculum—Students are required to complete 30 units of IPS approved courses for their area of concentration (see list below). A gateway course in the area of concentration must be taken prior to enrolling in subsequent courses. A complete list of the courses in these areas is available from the IPS program office.

- Democracy, Development, and Rule of Law
- Energy, Environment, and Natural Resources
- Global Health
- Global Justice
- International Negotiation and Conflict Management
- International Political Economy
- International Security and Cooperation

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.

Grade Requirements—All courses to be counted toward the degree, except IPS 300, must be taken for a letter grade.

Financial Aid—Financial aid 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 updated information, please visit the program office or website. For course descriptions, see respective department listings.

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: Coit D. Blacker (Freeman Spogli Institute for International Studies), James Fearon (Political Science), Judith L. Goldstein (Political Science), Stephen H. Haber (Political Science), Timothy Josling (Freeman Spogli Institute for International Studies), Michael McFaul (Political Science), Ronald I. McKinnon (Economics), James Sheehan (History), Michael Tomz (Political Science)
Affiliated Faculty: David Abernethy (Political Science), Barton Bernstein (History), Gordon Chang (History), Larry J. Diamond (Hoover Institution), Peter Duus (History), Amir Eshel (German Studies), Zephyr Frank (History), Lawrence H. Goulder (Economics), David J. Holloway (History, Political Science), Terry L. Karl (Political Science), David M. Kennedy (History), Stephen D. Krasner (Political Science), Gail Lapidus (Freeman Spogli Institute for International Studies), Beatriz Magaloni (Political Science), Mark I. Mancall (History), Isabela Mares (Political Science), 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), William J. Perry (Freeman Spogli Institute for International Studies, Management Science and Engineering), Richard Roberts (History), Scott Sagan (Political Science), Debra M. Satz (Philosophy), Andrew Walder (Sociology), Amir Weiner (History), Jeremy Weinstein (Political Science), Ann Wren (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), Boaz Ganor (Hoover Institution), Yifat Holzman-Gazit (Law), Katherine Jolluck (History), Martin W. Lewis (History), Pawel Lutomski (International Relations), Alice Lyman Miller (Hoover Institution), Thomas O'Keefe (International Relations), Bertrand Patenaude (Hoover Institution), Stephen Stedman (Political Science), Richard Steinberg (International Comparative and Area Studies), Joshua Teitelbaum (Hoover Institution), 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 have the subject code INTNLREL, and are listed in the "International Relations (INTNLREL) Courses" section of this bulletin.

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. Many IR students pursue careers in government, nongovernmental organizations, and business, or go to graduate school in law, business, economics, or political science.

UNDERGRADUATE PROGRAMS IN INTERNATIONAL RELATIONS

International Relations offers an undergraduate Bachelor of Arts program, an honors program, and a minor in International Relations.

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. For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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 course designated as writing intensive (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. The Organization and Behavior of Democracies
INTNLREL 125. Japanese Postwar Politics
INTNLREL 131. Globalization and Organizations
INTNLREL 140A. International Law and International Relations
INTNLREL 140B. Theories of International Law
INTNLREL 163. History and Geography of Contemporary Global Issues
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: Peace building 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 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 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 161B. Global Human Geography: Europe and Americas
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

SCIENCE, TECHNOLOGY, and SOCIETY
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 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 tracks (CPHA, CCAS, CIPE), or four courses relating to the same geographic region (Africa, Europe, Latin America, and Russia/East Europe).

JEWISH STUDIES

Directors: Charlotte Fonrobert, Vered 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), Charlotte Fonrobert (Religious Studies), Avner Greif (Economics), Mark Mancall (History), Norman Naimark (History), Jack Rakove (History), Aron Rodrigue (History), David Rosenhan (Law, Psychology, emeritus), Gabriella Safran (Slavic Languages and Literatures), Vered Shemtov (African and Middle Eastern Languages and Literatures), Peter Stansky (History), Sam Wineburg (Education), Amir Weiner (History), Steven Zipperstein (History)

Offices: Building 360, Room 362H
Mail Code: 94305-2190
Phone: (650) 725-0577
Email: jewish.studies@stanford.edu
Web Site: http://jewishstudies.stanford.edu

The Taube Center for Jewish Studies investigates all aspects of Jewish life in history, religion, literature, language, education and culture 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, the Dr. Bernard Kaufman Undergraduate Research Award in Jewish Studies to an undergraduate engaged in research on Jews in modernity, and it coordinates the annual Dorot Travel Grants for summer study in Israel.

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

INDIVIDUALLY DESIGNED MAJOR

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.

REQUIREMENTS

The faculty members in Jewish Studies have designed the following structure for the major:

Category	*Units*
History and Society:	
Students must take one course in each of the three periods: biblical and ancient, medieval and modern, and contemporary	20
Religion:	
Biblical, rabbinic, medieval, modern	20
Literature:	
Hebrew, Holocaust, American Jewish, Yiddish, German Jewish, Russian Jewish	15
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
Ancillary Courses:	
Ancient history, medieval history, modern European history, history of philosophy, Islam, Christianity	8-10
Total number of units required	75-77

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.

COGNATE 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.

AMELANG 173. Politics and Poetics in Israeli Literature: David Grossman and Other Contemporary Hebrew Writers
AMELANG 176. Introduction to Ladino: Language, Literature, and Culture
AMELANG 177. Middle Eastern Cities in Literature and Film
AMELANG 297. Directed Reading in African and Middle Eastern Languages
AMELANG 395. Graduate Studies in African and Middle Eastern Languages
AMELANG 50A. Reading Hebrew, First Quarter
AMELANG 50B. Reading Hebrew, Second Quarter
AMELANG 128A. Beginning Hebrew, First Quarter
AMELANG 128B. Beginning Hebrew, Second Quarter
AMELANG 128C. Beginning Hebrew, Third Quarter
AMELANG 129A. Intermediate Hebrew, First Quarter
AMELANG 129B. Intermediate Hebrew, Second Quarter
AMELANG 129C. Intermediate Hebrew, Third Quarter
AMELANG 130C. Advanced Hebrew, Third Quarter
AMELANG 140A. Beginning Yiddish, First Quarter
AMELANG 140B. Beginning Yiddish, Second Quarter
AMELANG 140C. Beginning Yiddish, Third Quarter
AMELANG 170A. Biblical Hebrew
AMELANG 170B. Biblical Hebrew
COMPLIT 22. Memory, History, and the Contemporary Novel (Same as GERLIT 246.)
CSRE 12. Presidential Politics: Race, Class, Faith, and Gender in the 2008 Election (Same as AFRICAAM 12.)
ECON 117. Economic History and Modernization of the Islamic Middle East
ENGLISH 140A. Creative Resistance and the Holocaust
FEMST 139. Rereading Judaism in Light of Feminism
GERLIT 121. Hanna Arendt
HISTORY 137/337. The Holocaust
HISTORY 229/329. Poles and Jews
HISTORY 85S. Jews, Christians and Muslims in a Mediterranean Port City: Salonica, 1821-1945
HISTORY 217A/317A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
HISTORY 217B/317B. Land of Three Religions: Medieval Spain
HISTORY 287B/387B. International Law and the Palestinian-Israeli Conflict
INTNLREL 150. The Arab-Palestinian Minority in Israeli Society
INTNLREL 155. Counter Terrorism
INTNLREL 207. Tribe, State, and Society in the Modern Middle East
JEWISHST 299A. Directed Reading in Yiddish, First Quarter
RELIGST 23. Introduction to Judaism
RELIGST 127A. Kabbalah: The Mystical Teachings of Judaism
SLAVGEN 153/253. Russian Jewish LIterature

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 four quarters before degree conferral. For example, a student graduating in Spring Quarter must declare the minor no later than the last day of Spring quarter of the junior 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 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, Regina Fupi (Fulbright Scholar), Estee Greif, Jon Levitow, Sangai Mohochi, Khalid Obeid, Gallia Porat, Ramzi Salti, Galen Sibanda

Catalan Language
Lecturers: Joan Molitoris (Coordinator and Associate Director, Language Center), Maria Del Carmen San Juan Pastor

Chinese Language
Coordinator: Chao Fen Sun (Professor, Asian Languages)
Lecturers: Marina Chung, Michelle DiBello, Sik Lee Dennig, Nina Lin, Yu-hwa Liao Rozelle, Hua Qian, Huazhi Wang, Hong Zeng, Youping Zhang, Qi Zhu

English for Foreign Students
Director and Senior Lecturer: Philip Hubbard
Lecturers: Robyn Brinks Lockwood, Carole Mawson, Andrea Kevech, Paul McPherron, Kenneth Romeo, Constance Rylance, Carol Shabrami, Seth Streichler

French Language
Lecturers: Julie De Clerck, Jane Dozer-Rabedeau, Heather Howard, Sylvie Palumbo-Liu, Tanya Shashko (Coordinator)

German Language
Coordinator: Elizabeth Bernhardt (Director, Language Center)
Senior Lecturers: William E. Petig, Kathryn Strachota (on leave Autumn)
Lecturer: Paul Nissler

Italian Language
Lecturers: Marta Baldocchi, Anna Cellinese, Sara Gelmetti (Coordinator), Alessandra McCarty, Giovanni Tempesta

Japanese Language
Coordinator: Yoshiko Matsumoto (Associate Professor, Asian Languages)
Senior Lecturer: Kazuko M. Busbin
Lecturers: Fumiko Arao, Hisayo O. Lipton, Momoyo K. Lowdermilk, Emiko Yasumoto Magnani, Kiyomi Nakamura, Yoshiko Tomiyama

Korean Language
Lecturers: Hee-Sun Kim (Coordinator), Yu-Jin Anh (Fulbright Scholar)

Portuguese Language
Senior Lecturer: Lyris Wiedemann (Coordinator; on leave Autumn)
Lecturer: Regina Lopes Dos Santos

Slavic Language
Senior Lecturer: Rima Greenhill
Lecturers: Eugenia Khassina (Coordinator), Marina Marcos

Spanish Language
Senior Lecturer: Irene Corso
Lecturers: Vivian Brates, Loreto Catoira, Citlalli del Carpio, Candy Guzmán (on leave Autumn), Caridad Kenna, Laura Méndez Barletta, Alice Miano (Coordinator), Joan Molitoris (Associate Director, Language Center), Carimer Ortiz Cuevas, Consuelo Perales, Veronika Reinhold, Kara Sanchez (on leave Winter and Spring), Cintia Santana, Ana M. Sierra, María Cristina Urruela, Hae-Joon Won

Special Language Program
Lecturers: Silfia Asningtias (Fulbright Scholar), Eda Mae Berio (Fulbright Scholar), Cathy Haas, Silky Maini (Fulbright Scholar), Sofia Pittaf (Fulbright Scholar), Eva Prionas (Coordinator, Modern Greek Language and Literature)

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 are listed in sections of this bulletin as follows:

- Courses in African and Middle Eastern Languages and Literatures have the subject code AMELANG, and are listed in "African and Middle Eastern Languages and Literatures (AMELANG) Courses."
- Courses in Catalan Language have the subject code CATLANG, and are listed in "Catalan Language (CATLANG) Courses."
- Courses in Chinese Language have the subject code CHINLANG, and are listed in "Chinese Language (CHINLANG) Courses."
- Courses in English for Foreign Students have the subject code EFSLANG, and are listed in "English for Foreign Students (EFSLANG) Courses."
- Courses in French Language have the subject code FRENLANG, and are listed in "French Language (FRENLANG) Courses."
- Courses in German Language have the subject code GERLANG, and are listed in "German Language (GERLANG) Courses."
- Courses in Italian Language have the subject code ITALLANG, and are listed in "Italian Language (ITALLANG) Courses."
- Courses in Japanese Language have the subject code JAPANLNG, and are listed in "Japanese Language (JAPANLNG) Courses."
- Courses in Korean Language have the subject code KORLANG, and are listed in "Korean Language (KORLANG) Courses."
- Courses in Portuguese Language have the subject code PORTLANG, and are listed in "Portuguese Language (PORTLANG) Courses."
- Courses in Slavic Language have the subject code SLAVLANG, and are listed in "Slavic Language (SLAVLANG) Courses."
- Courses in Spanish Language have the subject code SPANLANG, and are listed in "Spanish Language (SPANLANG) Courses."
- Courses in the Special Language Program have the subject code SPECLANG, and are listed in "Special Language Program (SPECLANG) Courses."
- Courses in the Tibetan Language Program have the subject code TIBETLNG, and are listed in "Tibetan Language Program (TIBETLNG) Courses."

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 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 2008-09 are listed below. Additional languages may still be offered upon request, provided funding is available. Requests for the 2009-10 academic year should be made by Spring Quarter of this year at 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://www.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.

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 oral proficiency interview, at least two quarters of lead time are essential for scheduling this interview. The interview will be conducted by a certified OPI rater.
3. Submit to the Language Center an academic paper written in the foreign language in question of at least five pages (two pages in the Asian languages and Russian).
4. Ask one Stanford University Academic Council faculty member to write a letter on the student's behalf, attesting to a high level of academic writing and composition skill in the foreign language.
5. Receive a rating of 'Advanced Low' on the Foreign Service Institute/American Council on the Teaching of Foreign Languages (FSI/ACTFL) oral proficiency scale, except in the non-cognate languages which require an 'Intermediate High' rating.

UNDERGRADUATE PROGRAM IN MIDDLE EASTERN LANGUAGES, LITERATURES, AND CULTURES

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. Courses taken which also fulfill a GER count toward fulfilling both minor and GER requirements.
6. Students pursuing the Cultural StudiesTrack 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, 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 non-language related courses, including one of the AMELANG 161-165 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 2008-09 are listed in the "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 2009-10 academic year should

be made by Spring Quarter of this year at the Special Language Program office.

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 yearâ€™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 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 2008-09 are listed below. Additional languages may still be offered upon request, provided funding is available. Requests for the 2009-10 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.

LATIN AMERICAN STUDIES

Director of the Center: Herbert S. Klein
Associate Director: Megan Gorman
Visiting Professors: Alexander Galetovic, Mauro Galetti, María Emma Mannerrelli, Sonia Rocha, Ernesto Schargrodsky, Juan Alfredo Tirao, José Luis Villacañas
Affiliated Faculty and Staff:
Anthropology: Clifford R. Barnett (emeritus), George Collier (emeritus), William H. Durham, James A. Fox, Dominique Irvine, John W. Rick, Ian Robertson
Art and Art History: Barbaro Martinez-Ruiz
Biology: Gretchen Daily, Rodolfo Dirzo, Harold Mooney, Peter Vitousek, Virginia Walbot
Comparative Literature: Roland Greene, Hans U. Gumbrecht
Earth Sciences, School of: Pamela Matson
Economics: Roger Noll (emeritus), Clark Reynolds (emeritus)
Education, School of: Martin Carnoy, Amado Padilla
Engineering, School of: Adrian Lew, Leonard Ortolano
English: Ramón Saldívar (also Comparative Literature)
Freeman Spogli Institute for International Studies: Rosamond Naylor, David Victor
History: Zephyr Frank, Tamar Herzog, Herbert S. Klein
Hoover Institute: William Ratliff
Human Biology: Anne Firth Murray
Language Center, Special Languages Program: José Carlos Fajardo
Law, School of: Thomas C. Heller

Linguistics: John Rickford
Medicine, School of: Victor F. Froelicher, Evaleen K. Jones, Samuel LeBaron, Grant Miller, Julie Parsonnet, Paul Wise
Political Science: Alberto Díaz-Cayeros, Terry Karl, Beatriz Magaloni, Robert Packenham (emeritus), Michael Tomz
Religious Studies: Thomas Sheehan
Sociology: Alex Inkeles (emeritus), Michael Rosenfeld
Spanish and Portuguese: Caridad Kenna, Alice Miano, Otilia Perales, Michael P. Predmore, Joan Ramon Resina, Jorge Ruffinelli, Ana Sierra, Lisa Surwillo, Guadalupe Valdés (also School of Education), Lyris Wiedemann, Yvonne Yarbro-Bejarano
Stanford University Libraries: Adán Griego, Robert Trujillo
Center Offices: Bolívar House, 582 Alvarado Row
Mail Code: 94305-8545
Department Phone: (650) 723-4444
Web Site: http://las.stanford.edu

The Center for Latin American Studies (CLAS) supports research and teaching on Latin America by the faculty and students of Stanford in all fields of study. Field research, language training, and interdisciplinary approaches are stressed in the Latin American Studies program, which draws on the strength and diversity of its nationally recognized faculty affiliates and substantial library holdings on Latin America. These resources are enhanced by the Tinker Visiting Professorship in Latin American Studies and the Nabuco Visiting Chair in Brazilian Studies, which bring distinguished Latin American scholars to teach at Stanford each year.

The center's resources include funds used in support of student and faculty activities and classes in and about Latin America, visiting professors and scholars, and various forms of public outreach. CLAS also devotes resources to Iberian and Caribbean studies. The center offers an undergraduate minor, an undergraduate honors program, and a master's degree in Latin American Studies.

UNDERGRADUATE PROGRAMS IN LATIN AMERICAN STUDIES

Although the center does not offer a B.A. in Latin American Studies, it does offer a minor and an honors program. Stanford also has departmental and interdisciplinary degree programs in which a student may concentrate on Latin America. These include Anthropology, History, Political Science, Spanish and Portuguese, and International Relations. Contact the respective departments for further information.

SUMMER INTERNSHIP GRANT

Each summer, the center awards grants to a small number of undergraduates to undertake internships in Latin America. Applications include a proposal, academic transcript, and recommendations from a faculty member and one other person knowledgeable about the applicant's abilities. Students from any department are eligible to apply. See http://las.stanford.edu/funding/undergrad_summer_intgrants.html.

HONORS COLLEGE

The LAS honors college, sponsored with many other departmental and interdisciplinary honors colleges by the Vice Provost for Undergraduate Education, is an intensive three-week residential program offered directly preceding Autumn Quarter. It affords returning LAS honors students who have completed field work a debriefing and a focused series of presentations by a member of the CLAS-affiliated faculty and other Stanford instructors on adviser interaction, bibliographic resources, writing strategies, statistical analysis, organizational techniques for completing the thesis process, and opportunities to socialize with other honors students in the college, all without cost to the students. Ample time is provided for library research, individual faculty consultations, and data analysis. Applications for honors colleges are available in Spring Quarter prior to the senior year.

MINOR IN LATIN AMERICAN STUDIES

The minor in Latin American Studies is offered to students in any major who wish to develop a complementary concentration on the region. To pursue the minor, students must submit for approval an online 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 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: HISTORY 70. Culture, Politics, and Society in Latin America
   b. 20 additional units at the 100 level or higher (Overseas Studies courses under the 100 level are applicable) which together comprise a coherent focus on a theoretical problem or issue of the region such as culture and identity, political economy, or sustainable development. At least 10 of the 25 units must be completed at Stanford. See the "Latin American Studies Cognate Courses" section following.
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. Completion of seven quarters of college-level study of Spanish or Portuguese.
   b. Completion of a course on Spanish or Portuguese language or literature, or on some other subject but taught in Spanish or Portuguese, at the 100-level or higher, with a letter grade of 'B' (3.0).
   c. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Language Center.
3. Field experience in Latin America such as study abroad, summer research, or internship is recommended.

Upon completion of all requirements, the center's 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 majors in any field. The aim of the honors program is to prepare students to pursue individualized research on Latin America, culminating in the preparation of an honors thesis written 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), in the 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: HISTORY 70, Culture, Politics, and Society in Latin America
   b. For breadth: two 4-5-unit courses at the 100 level or higher with a focus on the region. These courses are normally taken during the sophomore and junior years. See courses listed as cognate course options under the Master of Arts program.
   c. For depth: one 4-5-unit course at the 100 level or higher with a focus on the region that explores an issue in depth of particular interest to the student, approved by the honors adviser. See courses listed as cognate course options under the Master of Arts program.
   d. LATINAM 198. Honors Thesis (1-10 units), under the supervision of the student's faculty 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. Core Latin American Studies course: LATINAM 201/301. Social Change in Latin America Since 1900. This Autumn Quarter honors seminar must be taken in the senior year.
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. See courses listed as cognate course options under the Master of Arts program.
g. Of the courses applied to 'b' and 'c' above, 10 units may be completed in Overseas Studies and 5 units may be taken as directed individual study. See OSP courses listed as cognate course options under the Master of Arts program.

2. Fulfill the Foreign Language Requirement (See below and see courses listed under PORTLANG, PORTLIT, SPANLANG, and SPANLIT.)
3. Submit an honors thesis which meets standards of scholarly excellence and is approved by the thesis adviser. If graduating in June, participate in the LAS honors symposium at the end of May.

More information about the honors program is available at http://las.stanford.edu/programs/honors_detailed.html.

FOREIGN LANGUAGE REQUIREMENT

The minimum requirement for completion of the honors program is advanced proficiency in Spanish or Portuguese by any one of the following means:

1. Completion of seven quarters of college-level study of Spanish or Portuguese.
2. Completion of a course on Spanish or Portuguese language or literature, or on some other subject but taught in Spanish or Portuguese, at the 100-level or higher, with a letter grade of 'B' (3.0).
3. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Language Center.

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 annual deadline for coterminal applications is January 6.

Coterminal applicants must submit: a 500-word statement of purpose; resume; 10-15 page double-spaced academic writing sample; three letters of recommendation; a Stanford transcript; and scores from the General Test of the Graduate Record Exam. Coterminal applicants must have a minimum GPA of 3.5 and a working knowledge of Spanish or Portuguese at the third-year level.

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 in the "Master of Arts in Latin American Studies" section of this bulletin.

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 the region.

Although the center does not offer a Ph.D. in Latin American Studies, Stanford has several departmental programs through which a student may concentrate on Latin America. These include Anthropology, History, Political Science, and Spanish and Portuguese. Contact the respective departments for admission information.

Admission—The application deadline is January 6. Applicants submit an online application, including a 500-word statement of purpose, resume, 10-15 page double-spaced academic writing sample, and 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 or for information on graduate admissions, go to http://gradadmissions.stanford.edu.

The joint Latin American Studies and Law program allows students to work toward an M.A. in Latin American Studies and a Doctor of Jurisprudence (J.D.) degree simultaneously, with a substantial number of courses allowed to count toward both degrees. Students must apply separately for admission to the School of Law and the School of Humanities and Sciences Latin American Studies program. (Note, Latin American Studies appears under the division of International Comparative and Area Studies.) For more information about joint degree programs in the School of Law, please visit the following web site: http://www.law.stanford.edu/program/degrees/joint/#joint_degrees.

To be eligible for a dual degree program with the Graduate School of Business (M.B.A.) or School of Medicine (M.D.), candidates must apply and be accepted independently to both programs.

Applicants must meet the University admission requirements, have a working knowledge of Spanish or Portuguese at the third-year level, 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.

Financial Aid—The Center for Latin American Studies has several graduate fellowships as well as limited research and course assistantship positions with the Tinker Visiting Professors each quarter.

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, and culture of the 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

This joint degree program grants an M.A. degree in Latin American 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 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. Enrollment in the JDP allows students to pursue an M.A. degree concurrently with the law degree and to count a defined number of units toward both degrees. Completing this combined course of study requires approximately four academic years, depending on the student's background and level of language training. Up to 11.25 quarter units of Law School courses with Latin American Studies content may be counted toward the M.A. degree. 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 AND BUSINESS

These dual degree programs 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 the Latin American Studies M.A. program and the Graduate School of Business or School of Medicine and be accepted by both.

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 online at http://www.stanford.edu/group/las/programs/MA.html.

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. in Latin American Studies, students must complete the following:

1. *Core courses* (15 units): one core five-unit course in each of three fields of specialization:

a. Culture and Society (CulSoc)—LATINAM 201/301, Social Change in Latin America Since 1900
b. Environment and Ecology (Eco)—ANTHRO 162/262, Indigenous Peoples and Environmental Problems
c. Political Economy (PolEcon)—POLISCI 248S, Latin American Politics.

These fields (CulSoc, Eco, and PolEcon) are not declared on Axess; they do not appear on the transcript or the diploma.

2. *Cognate courses* (15 units): three courses, one from each of the three fields of specialization listed in '1' above. See "Latin American Studies Cognate Courses" following. See http://www.stanford.edu/group/las/programs/MA_cognate_curriculum.html for more information.
3. *Elective courses* (10-15 units): three elective courses in one of the three fields of specialization (see '1' above) from across the University's offerings.
4. *Language requirement:* at least 3 units of course work on a second Latin American language. Students must take either an advanced third-year language course if they have both Spanish and Portuguese, or take a basic course in the language in which they do not possess competence.
5. *Seminar requirement:* enroll each quarter in LATINAM 200, a 1-unit seminar on Contemporary Issues in Latin American Studies, where guest scholars present analyses of major Latin American themes and topics.
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.
7. *Grade requirements:* courses to be counted toward the degree, except LATINAM 200, must be taken for a letter grade and receive a grade of 'B' or higher.

LATIN AMERICAN STUDIES COGNATE COURSES

The following courses may be used to satisfy requirements in the master's program and in undergraduate honors and minor programs.

CULTURE AND SOCIETY (CULSOC)

ANTHRO 101. The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology
ANTHRO 103A/203A. Humanized Landscapes: Archaeological Approaches to Human/Environment Interactions (Same as ARCHLGY 101B/301B.)
ANTHRO 105/205. Ancient Cities in the New World
ANTHRO 105A/205A. Indigenous Peoples of South America and the Politics of Ethnicity
ANTHRO 107A/207A. Ethnohistory in the Andean World: Inca State, Rebellions, and Resistance
ANTHRO 120. Introduction to Language Change (Same as LINGUIST 160.)
ANTHRO 123A. Human Diversity: A Linguistic Perspective (Same as HUMBIO 187.)
ANTHRO 374. Beginnings of Social Complexity
COMPLIT 121. Poems, Poetry, Worlds: An Introductory Course
COMPLIT 123. The Novel, The World (Same as ENGLISH 184.)
COMPLIT 141. Literature and Society in Africa and the Caribbean (Same as FRENLIT 133.)
COMPLIT 142. The Literature of the Americas (Same as ENGLISH 172E.)
COMPLIT 149. What is Nobel Literature? Reading, Assessing, and Interpreting the Nobel Novels on the World Stage
COMPLIT 233. Baroque and Neobaroque (Same as ENGLISH 233, SPANLIT 293E.)
CSRE 145A. Poetics and Politics of Caribbean Women's Literature (Same as ANTHRO 145A.)
EDUC 136/306D. World, Societal, and Educational Change: Comparative Perspectives (Same as SOC 231.)
EDUC 149/249. Theory and Issues in the Study of Bilingualism
EDUC 193A. Listen Up! Core Peer Counseling Skills
EDUC 193B. Peer Counseling in the Chicano/Latino Community
FILMSTUD 116/316. International Documentary
GSBGEN 374. Interpersonal Influence and Leadership
HISTORY 70. Culture, Politics, and Society in Latin America
HISTORY 106B. Global Human Geography: Europe and Americas
HISTORY 170. Colonial Latin America
HISTORY 205B/305B. Quantitative Methods in Historical Research
HISTORY 206. History and Geography of Contemporary Global Issues
HISTORY 217B/317B. Land of Three Religions: Medieval Spain
HISTORY 273B/373B. Latin American Societies: The Public and the Domestic Domain
HISTORY 275F/375F. Social Change in Latin America Since 1900 (Same as LATINAM 201/301.)
HISTORY 279A/379A. Visual and Urban Culture of Modern Latin America
HISTORY 299X/399A. Design and Methodology for International Field Research
SPANLIT 102N. Contemporary Latin American Theater
SPANLIT 106N. Contemporary Latin American Novel in Translation
SPANLIT 109Q. Ten Latin American Protagonists who Changed the World
SPANLIT 120. Introduction to Literary and Scholarly Research
SPANLIT 130. Cultural Perspectives in Iberia
SPANLIT 131. Cultural Perspectives in the Luso-Hispanic Americas
SPANLIT 136. Survey of Modern Iberian Literature
SPANLIT 157. Introduction to Medieval and Early Modern Iberian Literatures
SPANLIT 161. Survey of Latin American Literature
SPANLIT 193. The Cinema of Pedro Almodóvar
SPANLIT 225E. Theater, Society, and Politics in 20th-Century Spain
SPANLIT 241. The Short Story: Theory and Praxis
SPANLIT 247E. Magical Realism and Globalization
SPANLIT 248. Politics, Terrorism, and Documentary Films in South America
SPANLIT 275. Cuban Cinema since the Revolution
SPANLIT 278. Senior Seminar: The *Novelas ejemplares* by Miguel de Cervantes and the Culture of the Baroque
SPANLIT 278A. Senior Seminar: Love and Politics in Latin America from Romanticism to Postmodernism
SPANLIT 317. Documentary Cinema in Spain: Between Reality and Fiction
SPANLIT 342. The Duty of Mischief: César Aira's Writing as Cultural Critique
SPANLIT 343. Nations, Continents, Worlds: Ortega and the Ibero-American Essay
SPANLIT 350. Roberto Bolaño: The Savage Detectives
PORTLIT 157. Introduction to Medieval and Early Modern Iberian Literatures
OSPMADRD 22. Spain on Stage: Theater and Performance in 2009
OSPMADRD 24. Spain and Africa through the Ages
OSPMADRD 25. European Legal History
OSPMADRD 26. Issues in European Law
OSPMADRD 34. Modern Spain
OSPMADRD 35. Issues in Spanish History
OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World
OSPMADRD 41. Dissidence and Continuity: Spanish Theater, 1907 to the Present
OSPMADRD 43. The Jacobean Star Way and Europe: Society, Politics and Culture
OSPMADRD 45. Women in Art: Case Study in the Madrid Museums
OSPMADRD 67. Women in Spain: From Tradition to Postmodernity
OSPMADRD 70. European Urban Development: The Cases of Madrid and Barcelona
OSPSANTG 10. Borges and Argentina
OSPSANTG 14. Women Writers of Latin America in the 20th Century
OSPSANTG 17. Chilean Fiction of the 20th Century
OSPSANTG 45. The Cinema of the Chilean Transition (1990-2007)
OSPSANTG 46. Topics in Chilean Cultural Expressions
OSPSANTG 62. Topics in Chilean History
OSPSANTG 104X. Modernization and Culture in Latin America
OSPSANTG 118X. Artistic Expression in Latin America

ENVIRONMENT AND ECOLOGY (ECO)

ANTHRO 162/262. Indigenous Peoples and Environmental Problems

ANTHRO 163D. Darwin's Legacy (Same as HUMBIO 184.)
ANTHRO 165. Parks and Peoples
ANTHRO 166A/266A. Indigenous Forest Management
BIO 101. Ecology
BIO 117. Biology and Global Change (Same as EARTHSYS 111.)
BIO 121. Biogeography
BIO 144. Conservation Biology (Same as HUMBIO 112.)
BIO 147/247. Controlling Climate Change in the 21st Century (Same as EARTHSYS 147/247, HUMBIO 116.)
BIO 175. Tropical Ecology and Conservation
BIO 180/280. Fundamentals of Sustainable Agriculture (Same as EARTHSYS 180/280.)
BIO 235. Challenges for Biodiversity Conservation in Latin America
CEE 142A/242A. Creating Sustainable Development
CEE 151/251. Negotiation (Same as ME 207, MS&E 285.)
CEE 165D/265D. Water and Sanitation in Developing Countries
CEE 173A/207A. Energy Resources (Same as EARTHSYS 103.)
CEE 177S/277S. Design for a Sustainable World
CEE 265A. Sustainable Water Resources Development
CEE 301. The Energy Seminar (Same as ENERGY 301.)
CEE 333. Water Policy Colloquium (Same as GES 333, IPER 333.)
EARTHSYS 101. Energy and the Environment (Same as ENERGY 101.)
EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes (Same as ENERGY 102.)
EARTHSYS 132/232. Energy Cooperation in the Western Hemisphere (Same as IPS 263.)
EARTHSYS 152/252. Pathways Out of Rural Poverty (Same as ECON 155B, IPS 261.)
EARTHSYS 181/281. Concepts of Urban Agriculture
EARTHSYS 184/284. Climate and Agriculture
HRP 240. Rethinking International Health (Same as MED 230.)
HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges
HUMBIO 156. Global HIV/AIDS (Same as MED 256.)
LAW 605. International Environmental Law: Climate Change
MED 108Q. Human Rights and Health
MED 242. Physicians and Human Rights
MED 262. Economics of Health Improvement in Developing Countries (Same as ECON 127.)
OSPMADRD 72. Issues in Bioethics Across Cultures
OSPSANTG 58. Living Chile: A Land of Extremes
OSPSANTG 85. Marine Ecology of Chile and the South Pacific

POLITICAL ECONOMY (POLECON)

ANTHRO 105A/205A. Indigenous Peoples of South America and the Politics of Ethnicity
EARTHSYS 132/232. Energy Cooperation in the Western Hemisphere (Same as IPS 263.)
EARTHSYS 152/252. Pathways Out of Rural Poverty (Same as ECON 155B, IPS 261.)
ECON 101. Economic Policy Analysis
ECON 106. World Food Economy
ECON 122. Economic Development of Latin America
ECON 123. Regulation and Competition in Less Developed Countries
ECON 127. Economics of Health Improvement in Developing Countries (Same as MED 262.)
ECON 166. International Trade
ECON 214,216. Development Economics I,II
ECON 220,221. Political Economy I,II
ECON 228. Institutions and Organizations in Historical Perspective
ECON 265. International Economics I
EDUC 131. Mediation for Dispute Resolution (Same as PSYCH 152.)
EDUC 222. Resource Allocation in Education
EDUC 306A. Education and Economic Development
EDUC 306Y. Economic Support Seminar for Education and Economic Development
EDUC 387A/B. Workshop: Comparative Studies of Educational and Political Systems (Same as SOC 311A/B.)
ETHICSOC 171. Justice (Same as IPS 208, PHIL 171/271, POLISCI 136S, PUBLPOL 207.)
HISTORY 378E. Political Economy of Development (Same as POLISCI 440B.)
IPS 203. Issues in International Economics
IPS 230. Democracy, Development, and the Rule of Law (Same as INTNLREL 114D, POLISCI 114D/314D.)
IPS 241. International Security in a Changing World (Same as POLISCI 114S.)
INTNLREL 141A. Camera as Witness: International Human Rights Documentaries
INTNLREL 147. The Political Economy of the Southern Cone of South America
INTNLREL 148. Economic Integration of the Americas
LAW 227. Political Economy of Energy Policy
LAW 330. International Human Rights
LAW 356. Dispute Resolution
LAW 582. Latin American Law
LAW 585. Transnational Law
LAW 611. International Conflict Colloquium
LAW 638. Mediation
LAW 658. International Human Rights Clinic
LAW 661. International Negotiation
LAWGEN 206. Thinking Like a Lawyer (Same as GSBGEN 382.)
POLISCI 140. Political Economy of Development
POLISCI 141. The Global Practice of Human Rights
POLISCI 144T. Democracies and Dictatorships
POLISCI 215. Explaining Ethnic Violence
POLISCI 243R. Research Seminar in Democratization and Human Rights
POLISCI 248S. Latin American Politics
POLISCI 440A. Theories in Comparative Politics
PSYCH 216. Public Policy and Social Psychology: Implications and Applications (Same as IPS 207B, PUBLPOL 205B.)
SOC 143/243. Poverty in Brazil: From Empirical Evidence to Anti-poverty Policies
OSPMADRD 42. A European Model of Democracy: The Case of Spain
OSPMADRD 66. E.U.-Latin American International Relations: Political and Economic Agenda for the 21st Century
OSPSANTG 68. The 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 141X. Politics and Culture in Chile
OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective

LINGUISTICS

Emeriti: (Professors) Clara N. Bush, Shirley Brice Heath, William R. Leben, Elizabeth C. Traugott
Chair: Thomas A. Wasow
Professors: Joan Bresnan, Eve V. Clark, Penelope Eckert, Martin Kay, Paul Kiparsky, Beth Levin (on leave), Stanley Peters, John R. Rickford, Ivan A. Sag, Thomas A. Wasow
Associate Professors: Daniel Jurafsky, Christopher Manning
Assistant Professors: Arto Anttila (on leave), Meghan Sumner
Senior Lecturers: Philip L. Hubbard, Beverley J. McChesney
Visiting Professor: Arnold Zwicky
Acting Assistant Professors: Asya Pereltsvaig, Uli Sauerland
Consulting Professors: Ronald Kaplan, Lauri Karttunen, Annie Zaenen
Consulting Associate Professors: Jared Bernstein, Cleo Condoravdi
Affiliated Faculty: Herbert H. Clark, James A. Fox, Kenji Hakuta, Miyako Inoue, Yoshiko Matsumoto, Orrin W. Robinson III, Richard D. Schupbach, Chao Fen Sun

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Web site: http://www-linguistics.stanford.edu

Courses offered by the Department of Linguistics have the subject code LINGUIST, and are listed in the "Linguistics (LINGUIST) Courses" section of this bulletin.

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. Faculty and visiting scholars in the department and the Center for the Study of Language and Information (CSLI), whose members are computer scientists, linguists, philosophers, and psychologists, participate extensively in the activities of the department.

UNDERGRADUATE PROGRAMS IN LINGUISTICS

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 chair. 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 PROGRAM

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.

GRADUATE PROGRAMS 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.

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 who should 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 LINGUIST 395A,B, 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 teaching assistant in Linguistics courses.
6. *Colloquia*—two oral presentations exclusive of the oral presentation of the dissertation proposal (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. a written dissertation proposal is required by the end of the third year.
   b. oral presentation of the dissertation proposal, preferably as a colloquium.
   c. approval of the dissertation topic and appointment of a dissertation committee.
   d. passing a University oral examination on the dissertation and related areas.
   e. dissertation (up to 15 units of LINGUIST 399).

PH.D. MINOR IN LINGUISTICS

1. *Courses:* the candidate must complete 30 units of coursework in linguistics at the 100 level or above, including LINGUIST 110, 120, and either 130A or 130B (100-level courses are waived if 200-level courses in the same area are taken), 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.

DIVISION OF LITERATURES, CULTURES, AND LANGUAGES

Division Head: Roland Greene
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

The Division of Literatures, Cultures, and Languages consists of five academic departments (Comparative Literature, French and Italian, German Studies, Slavic Languages and Literatures, and Spanish and Portuguese) 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 tradition and expression, 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.

In addition to the undergraduate Minor programs, the DLCL offers instruction in a small number of courses, including an undergraduate multimedia laboratory course and several graduate courses focused on the teaching of second languages, the teaching of literature, and academic professionalization. All such courses may be found under the subject code DLCL in the section of this bulletin listing university courses.

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 and elsewhere in the University.

Course work in these minors may not duplicate work counted toward language majors or other 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 directors 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) or beyond in two languages other than English offered by the DLCL. Normally, this involves 12 units in each language.
2. At least one additional course 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. In the case of Slavic or Asian languages, the course should be marked as advanced.

Students are recommended to study, work, or intern abroad for at least eight weeks at a location where one of the languages is spoken.

MATHEMATICAL AND COMPUTATIONAL SCIENCE

Director: Bradley Efron
Associate Director: Susan Holmes
Committee in Charge: Takeshi Amemiya (Economics), Gunnar Carlsson (Mathematics), Richard Cottle (Management Science and Engineering), Thomas M. Cover (Electrical Engineering, Statistics), Bradley Efron (Statistics), Peter W. Glynn (Management Science and Engineering), J. Michael Harrison (Graduate School of Business), Susan Holmes (Statistics), Parviz Moin (Engineering), Art Owen (Statistics), George Papanicolaou (Mathematics), Eric Roberts (Computer Science), David Rogosa (Education), Tim Roughgarden (Computer Science), Mehran Sahami (Computer Science), David Siegmund (Statistics), Arthur F. Veinott Jr. (Management Science and Engineering), Nancy R. Zhang (Statistics)
Program Administrator: Helen Tombropoulos

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Courses offered by the Program in Mathematical and Computational Science have the subject code MCS, and are listed in the "Mathematical and Computational Science (MCS) Courses" section of this bulletin.

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 automatic 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 PROGRAMS IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

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)	A	3
or MATH 110. Applied Number Theory and Field Theory (WIM)	S	3
or MATH 120. Modern Algebra (WIM)	A,S	3
MATH 104. Applied Matrix Theory	A,W	3
or MATH 113. Linear Algebra & Matrix Theory	A,W,S	3

Computer Science (CS): 16-18 units

CS 103. Mathematical Foundations of Computing	W	5
or CS 103A. Discrete Mathematics for Computer Science	A	3
and CS 103B. Discrete Structures	W	3
CS 106X. Programming Methodology and Abstractions (Accel.)	A, S	3-5
or CS 106A. Programming Methodology	A,W,S	3-5
and CS 106B. Programming Abstractions	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	A,S	3-4
CS 161. Design and Analysis of Algorithms	A,W	3-4

Management Science and Engineering (MS&E): 8-9 units

MS&E 111. Introduction to Optimization (same as ENGR 62)	A,S	3-4
and MS&E 121. Introduction to Stochastic Modeling	W	43
or MS&E 221. Stochastic Modeling	W	
or three of the following:		
MS&E 211. Linear and Nonlinear Optimization	A	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	W	3

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 for submission to the committee in charge for approval. 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	S	5
ECON 160. Game Theory and Economic Applications (prerequisite ECON 51)	W	5
ECON 179. Experimental Economics	W	5
EE 261. The Fourier Transform and its Applications	A,W	3
MS&E 211. Linear and Nonlinear Optimization	A	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	W	3
MCS 100. Mathematics of Sports (same as STATS 50) (not given 2008-09)		3
MATH 104. Applied Matrix Theory	A, W	3
MATH 106. Functions of a Complex Variable	W	3
MATH 108. Introduction to Combinatorics and its Applications	S	3
MATH 111. Computational Commutative Algebra (not given 2008-09)		3
MATH 113. Linear Algebra & Matrix Theory	A,W,S	3
MATH 115. Functions of a Real Variable	A,W	3
MATH 116. Complex Analysis	W	3
MATH 118. Mathematics of Computation	W	3
MATH 131. Partial Differential Equations I	A,W	3
MATH 132. Partial Differential Equations II	S	3
MATH 135. Nonlinear Dynamics and Chaos (not given 2008-09)		3
MATH 136. Stochastic Processes	A	3
PHIL 151. First-Order Logic	W	4
STATS 202. Data Analysis	A	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	S	5
CS 140. Operating Systems and Systems Programming	A,W	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 194. Software Project (prerequisite CS 108)	S	3
CS 221. Artificial Intelligence: Principles and Techniques	W	3-4
CS 223A. Introduction to Robotics	W	3
CS 223B. Introduction to Computer Vision	W	3
CS 225A. Experimental Robotics (not given 2008-09)		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	A	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.

1. At least three quarters before graduation, majors must file with their advisers a plan for completing degree requirements.
2. All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered satisfactory/no credit only.
3. 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.
4. 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	
MATH 135. Nonlinear Dynamic Systems (not given 2008-09)		3

Replace STATS 191/203 by

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)	S	3
BIO 133. Genetics of Prokaryotes	A	3
BIO 134. Replication of DNA	W	3
BIO 135. Biological Clocks (not given 2008-09)		3
BIO 136. Evolutionary Paleobiology (not given 2008-09)		4
BIO 143/243. Evolution	A	4
BIO 144. Conservation Biology	W	3-4
BIO 160A. Developmental Biology I	W	4
BIO 160B. Developmental Biology II	S	4
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)	S	3
ANTHRO 180. Introduction to Anthropological Genetics	S	5
ANTHRO 187. The Genetic Structure of Populations (not given 2008-09)		5
ANTHRO 188. Research in Anthropological Genetics (not given 2008-09)		5
BIO 113. Fundamentals of Molecular Evolution (not given 2008-09)		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,W	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	W	3
MATH 108. Introduction to Combinatorics Applications	S	3
MATH 116. Complex Analysis	W	3
MATH 118. Mathematics of Computation	W	3
MATH 132. Partial Differential Equations II	S	3
MATH 135. Nonlinear Dynamics and Chaos (not given 2008-09)		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	S	3
ENGR 30. Engineering Thermodynamics	A,W	3
ENGR 40. Introductory Electronics	A, S	5
ENGR 50. Introductory Science Materials	A,W, S	4
ENGR 105. Feedback Control Design	W	3

Take three additional courses from a single engineering department, and two additional courses from any engineering department(s).

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. Four 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 118. Mathematics of Computation
MATH 131. Partial Differential Equations I
MATH 132. Partial Differential Equations II
MATH 135. Nonlinear Dynamics and Chaos
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: Kai Lai Chung, 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, 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, Richard Schoen, Leon Simon, Kannan Soundararajan, Ravi Vakil, Andras Vasy, Akshay Venkatesh, Brian White
Associate Professor: Soren Galatius
Szegö Assistant Professors: Laurent Demanet, Fei Han, Gautam Iyer, Vladislav Kargin, Joan Licata, Antoine Toussaint, Denis Trotabas, Leo Tzou
Lecturers: Adrian Butscher, 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

Web site: http://math.stanford.edu

Courses offered by the Department of Mathematics have the subject code MATH, and are listed in the "Mathematics (MATH) Courses" section of this bulletin.

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.

UNDERGRADUATE PROGRAMS IN MATHEMATICS

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.

INTRODUCORY 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 four classes on linear algebra: 51 (or 51H), 104, 113, and 114.

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. In any case, students are strongly 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 study. 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; 111; 115; 118
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; see, also, the discussion of the honors program below:

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 of the following courses, including at least one from each group: algebra sequence 114, 121, 152, 156; analysis sequence 131, 132, 135, 151, 174A,B, 175; geometry/topology sequence 143, 145, 146, 147, 148; logic and set theory sequence PHIL 151, 152; MATH 161.

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; 111; 115; 118; 131; 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. Students who have instead taken the sequence 51, 52, 53 in their freshman year may be permitted to enter the honors program, but such entry must be approved by the Department of Mathematics Committee for Undergraduate Affairs.

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 include all the math courses 106 or 116, 120, 171 and also must include seven or more additional courses, with at least one from each of the groups: algebra sequence 114, 121, 152, 154, 155, 156; analysis sequence 131, 132, 135, 136, 151, 172, 174A, 174B, 175, 176; geometry/topology sequence 143, 145, 146, 147, 148; logic and set theory sequence PHIL 151, PHIL 152, and MATH 161.
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.

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.

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

Committee in Charge: Philippe Buc, Hester Gelber, Hans Ulrich Gumbrecht, Robert P. Harrison, Nancy S. Kollmann, Seth Lerer, William Mahrt, Bissera Pentcheva, Jennifer Summit, Rega Wood

Affiliated Faculty: Cecile Alduy (French and Italian), Theodore Andersson (German Studies), Vincent Barletta (Spanish and Portuguese), 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)

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Web Site: http://www.stanford.edu/dept/medieval

Courses offered by the Program in Medieval Studies have the subject code MEDVLST, and are listed in the "Medieval Studies (MEDVLST) Courses" section of this bulletin.

The Medieval Studies Program is administered through Interdisciplinary Studies in Humanities, but the degree is conferred by the Dean of Undergraduate Studies Advisory Committee on Individually Designed Majors. The committee has approved the program as listed below. Students interested in pursuing a Medieval Studies major or minor should visit the program office in Building 240 and consult the Director of Medieval Studies. The major is normally declared by the beginning of the student's third 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 director, including ten courses as follows:

1. The introductory course, MEDVLST 165, Crusades: Interdisciplinary Approaches. Offered alternate years. Not offered 2008-09.
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 course 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 programs 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.

Medieval Studies has a Writing in the Major (WIM) requirement. It 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 specific requirements for each of these options. Courses used to satisfy Medieval Studies major requirements must be taken for a 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 106/306. Byzantine Art and Architecture, 300-1453 C. E.
ARTHIST 107/307. Age of Cathedrals
ARTHIST 108/308. Virginity and Power: Mary in the Middle Ages
ARTHIST 187/387. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868 (Same as JAPANGEN 87)
ARTHIST 207A. The Message of Light and Color: The Art of Mosaics in the Mediterranean
ARTHIST 409. Iconoclasm
ECON 228. Institutions and Organizations in Historical Perspective
ENGLISH 102. Chaucer
ENGLISH 301A. Medieval Affect
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 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
HISTORY 212/312. Holy Wars: Medieval Perspectives

HISTORY 217A/317A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
HISTORY 217B/317B. Land of Three Religions: Medieval Spain
HISTORY 232G/332G. When Worlds Collide: The Trial of Galileo
HISTORY 282B/382B. Islamic Thought and Culture in the Premodern Middle East, 800-1800
HISTORY 314. Graduate Core Colloquium in Medieval European History
HISTORY 317/322. Medieval Seminar: Classics and Key Works
ITALGEN 236E. *Purgatorio*/*Paradiso*
ITALGEN 264E. Petrarch and Petrarchism (Same as COMPLIT 216)
LAW 586. Classical Islamic Law (Same as RELIGST 201/301)
MUSIC 40. Music History to 1600
MUSIC 140/240. Studies in Medieval Music
MUSIC 141/241. Studies in Renaissance Music
MUSIC 221. Topics in the History of Theory
MUSIC 301A. Analysis of Music: Modal
MUSIC 310. Research Seminar in Musicology
PHIL 115/215. Problems in Medieval Philosophy
PHIL 248. Medieval Latin Paleography
RELIGST 84. Mystics, Pilgrims, Monks, and Scholars: Religious Devotion in Medieval Christianity
RELIGST 172. Sex, Body, and Gender in Medieval Religion
RELIGST 222. Literature and Society in Medieval Islam
RELIGST 223. Studying Islam: History, Methods, Debates
RELIGST 227/327. *The Qur'ân*
RELIGST 258/358. Japanese Buddhist Texts
RELIGST 263. Judaism and the Body
RELIGST 271A,B. Dante's Spiritual Vision
RELIGST 308. Medieval Japanese Buddhism
RELIGST 226/326. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period
SPANLIT 105N. Don Quixote
SPANLIT 157. Introduction to Medieval and Early Modern Iberian Literatures (Same as PORTLIT 157)
SPANLIT 216. Other Words: Crypto-Muslims in Early Modern Iberia
SPANLIT 314. Poetic Form and Performance: The Medieval Iberian Lyric
SPANLIT 329. The Valencian Segle d'Or

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 office of Interdisciplinary Studies in Humanities.

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 Heise
Committee in Charge:(Chair) Ursula Heise, Lanier Anderson, Scott Bukatman, Shelley Fisher Fishkin (on leave winter, spring), Hans U. Gumbrecht, Sean Hanretta (on leave), Andrea A. Lunsford, Saikat Majumdar, Liisa Malkki, Helen Stacy, Fred Turner (spring)
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 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), Franco Moretti (English, Comparative Literature), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Italian), David Palumbo-Liu (Comparative Literature), Arnold Rampersad (English), 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 (Spanish and Portuguese)

Program Offices: Building 240
Mail Code: 94305-2022
Phone: (650) 723-3413
Email: idstudies.moore@stanford.edu
Web Site: http://www.stanford.edu/dept/MTL

Courses offered by the Program in Modern Thought and Literature have the subject code MTL, and are listed in the "Modern Thought and Literature (MTL) Courses" section of this bulletin.

The Program in Modern Thought and Literature is administered through the office of Interdisciplinary Studies in Humanities. The program admits students for the Ph.D. and a very 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 undergraduate major in Interdisciplinary Studies in Humanities. This program is designed for students with a commitment to interdisciplinary study in the humanities. Students may devise majors that incorporate modern literature (since the 18th century), cultural history, and critical theory. Students may also create majors in other interdisciplinary concentrations. For course guidelines, see the *Handbook for the Major in Interdisciplinary Studies in Humanities*. Students wishing to declare the major in Interdisciplinary Studies in Humanities must apply for admission to the Humanities honors program and for graduation with honors in Humanities.

COTERMINAL BACHELOR'S AND MASTER'S PROGRAM

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 degree 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.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#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, The Modern Tradition I, or 334B, The Modern Tradition II, 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.

GRADUATE PROGRAMS IN MODERN THOUGHT AND LITERATURE

The Ph.D. in Modern Thought and Literature is an interdisciplinary program combining work in modern literary/cultural studies with work in one or more other modern disciplines. It is designed for students who have a strong interest in literature or culture, but whose approach or focus requires an interdisciplinary program, such as students interested in anthropological or philosophical approaches to literature and culture, gender studies, ethnic studies, or in topics such as legal humanities, popular culture, and social or cultural theory.

Modern Thought and Literature is intended for students who plan to teach and write in literature departments or in interdisciplinary programs in the humanities, cultural studies, or humanistic social sciences, or for students intending to formulate cultural policy.

Course work in the program is divided about evenly between advanced courses in literature departments and advanced courses in non-literary departments.

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.

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, The Modern Tradition I and II (5 units each)
2. MTL 299, Edgework: New Directions in the Study of Culture (2 units, winter) and MTL 300, The Modern Thought and Literature Colloquium (1 unit, spring), 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 each 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 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 interdisciplinary 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, normally is 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. *Colloquium on the Dissertation Proposal:* sometime after the University oral examination, or in conjunction with that examination, the dissertation committee assembles for up to one hour to discuss the dissertation proposal with the student. Prior to this meeting, the student should have consulted each member of the committee to discuss the proposal and compile a bibliography.
12. *Dissertation:* the fourth and fifth years are devoted to the dissertation, which should be a substantial and original contribution acceptable to the Committee on Modern Thought and Literature. The subject is drawn from the literature of specialization and the area of nonliterary studies.

PH.D. IN MODERN THOUGHT IN LITERATURE AND HUMANITIES

The program participates in the Graduate Program in Humanities leading to a Ph.D. degree in Modern Thought and Literature and Humanities. For a description of the Humanities program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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 (on leave), Brian Ferneyhough (on leave), Thomas Grey, Stephen Hinton, Julius O. Smith (on leave Autumn)
Associate Professors: Mark Applebaum, Heather Hadlock, William P. Mahrt
Assistant Professors: Jaroslaw Kapuscinski, Jesse Rodin, Ge Wang
Professor (Teaching): George Barth (Piano; on leave Winter, Spring)
Associate Professor (Teaching): Stephen M. Sano (Director of Choral Studies)
Associate Professor (Performance): Jindong Cai (Director of Orchestral Studies)
Courtesy Professor: Paul DeMarinis
Senior Lecturers: Giancarlo Aquilanti (Director of Theory; Wind Ensemble), Stephen Harrison (Violoncello), Thomas Schultz (Piano), Gregory A. Wait (Voice; Director of Vocal Studies), Frederick R. Weldy (Piano)
Lecturers: Kumaran Arul (Piano), Talya Berger (Theory), Fredrick Berry (Jazz Ensemble), Frances Blaisdell (Flute), Mark Brandenburg (Clarinet), Marjorie Chauvel (Harp), Tony Clements (Tuba), Laura Dahl (Resident Collaborative Pianist), Natasha Daniels (Viola), Anthony Doheny (Violin), John Dornenburg (Viola da Gamba), Charles A. Ferguson (Guitar), Debra Fong (Violin), Claire Giovannetti (Voice), Dawn Harms (Violin, Viola), Alexandra Hawley (Flute), David Henderson (Classical Saxophone), Melody Holmes-Schaefle (Flute), Robert Hubbard (Oboe), Graeme Jennings (Violin), Joyce Johnson-Hamilton (Trumpet), Jay Kadis (Audio Recording), McDowell Kenley (Trombone), Mary Linduska (Voice), Fernando Lopez-Lezcano (CCRMA), Murray Low (Jazz Piano), Janet Maestre (Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), 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), Amy Schneider (Voice; on leave Autumn), Robin Sharp (Violin), Jerome Simas (Clarinet), Livia Sohn (Violin), Elaine Thornburgh (Harpsichord), Erik Ulman (Composition, Theory), Linda Uyechi (Taiko), 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)

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 have the subject code MUSIC, and are listed in the "Music (MUSIC) Courses" section of this bulletin.

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.

UNDERGRADUATE PROGRAMS IN MUSIC

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 also 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 (USSO) in the department prior to declaring the major. It is highly recommended that prospective majors schedule this consultation with the USSO 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.

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 office, 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. Eighteenth-Century 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 148. Musical Shakespeare: Theater, Song, Opera, and Film
   MUSIC 151. Psychophysics and Cognitive Psychology for Musicians
5. *Applied*—
   a. minimum 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. minimum 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 may count for up to two of the ensemble-unit requirements for the Music major.
   Note—MUSIC 156, "sic": Improvisation Collective; MUSIC 157, Mariachi Band; and MUSIC 161C, Red Vest Band, 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.

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 169A/269A. Seminar in Performance Practices
   MUSIC 269B. 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 140–148/240–248, 151—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
   MUSIC 169A/269A. Seminar in Performance Practices
   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 151. Psychophysics and Cognitive Psychology for Musicians (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 and 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—
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 140-148, 151 (4 units)

Required Courses for the Minor 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 151. Psychophysics and Cognitive Psychology for Musicians (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)

GRADUATE PROGRAMS IN MUSIC

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 16 application deadline. All components of the application are due by December 16. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see http://gradadmissions.stanford.edu).

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 coursework.

DEGREE REQUIREMENTS

A minimum of 45 academic units is required for the master's degree in Music. The Department of Music does not accept students 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*—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 units focusing on the integration of music perception, music-related signal processing and controllers, and synthesis. The program is designed for students having an undergraduate engineering or science degree or a degree that includes course work in engineering mathematics. In addition to degree requirements required of all students listed above, students must complete at least 39 units of approved course work. 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 151. Psychophysics and Cognitive Psychology for Musicians (4 units)
   - 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 6 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 16 application deadline. All components of the application are due by December 16. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see http://gradadmissions.stanford.edu).

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 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 16 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.

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 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 Defense*—Required during the last quarter of residence, the purpose of the defense is to demonstrate the ability of the candidate to organize and present the topic of the Final Project for public review. It should be one hour in length, treating aspects of the final project. Details regarding the D.M.A. defense 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 major work for full orchestra or chamber ensemble with chorus, instruments, voices, electronic media, or a combination of these. 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 minimum membership of the reading committee is the principal dissertation adviser and a second member from the department. A third member from the department is optional. All members of the committee must belong to the Academic Council. 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 underway; an oral presentation and 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 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 underway; an oral presentation and 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.

PH.D. IN MUSIC AND HUMANITIES

The department participates in the Graduate Program in Humanities leading to a Ph.D. degree in Music and Humanities. For a description of the program, see the "Interdisciplinary Studies in Humanities" section of this Bulletin.

PHILOSOPHY

Emeriti (Professors): Fred Dretske, Solomon Feferman, Georg Kreisel, Julius Moravcsik, 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, Dagfinn Føllesdal (Autumn), Michael Friedman, Helen Longino, Grigori Mints, Debra Satz, Brian Skyrms (Spring), Kenneth Taylor (on leave), Johan van Benthem (Spring), Thomas Wasow, Allen Wood (on leave), Rega Wood (Research, on leave)
Associate Professors: Lanier Anderson, Mark Crimmins, Graciela De Pierris, David Hills (Teaching), Nadeem Hussain, Krista Lawlor
Assistant Professors: Alexis Burgess, Tamar Schapiro
Courtesy Professors: Reviel Netz, Josiah Ober
Lecturers: Shane Duarte, Thomas Ryckman, Joel Velasco
Acting Assistant Professor: Eric Pacuit
Distinguished Visiting Professor: George Smith

Department Offices: Building 90
Mail Code: 94305-2155
Department Phone: (650) 723-2547
Email: philosophy@csli.stanford.edu
Web Site: http://www-philosophy.stanford.edu

Courses offered by the Department of Philosophy have the subject code PHIL, and are listed in the "Philosophy (PHIL) Courses" section of this bulletin.

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 enquiry. 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.

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.

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.

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. These associations elect student representatives to department meetings.

UNDERGRADUATE PROGRAMS IN PHILOSOPHY

BACHELOR OF ARTS IN PHILOSOPHY

There are two ways of majoring in philosophy: the General Program and the Special Program in the History and Philosophy of Science. A student completing either 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 strongly urges 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 (formerly 57), 150 (formerly 159), 151 (formerly 160A), 154 (formerly 169)
      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 (formerly 57), 150 (formerly 159), 151 (formerly 160A), 154 (formerly 169)
   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, either through the Philosophy honors program, or through Interdisciplinary Studies in the Humanities.

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.

The Department of Philosophy cooperates with the honors component of the "Interdisciplinary Studies in Humanities" as described in that section of this bulletin.

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 can count a maximum of 5 units towards the introductory Philosophy requirement.
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 Area 1 (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 (formerly 57), 150 (formerly 159), 151 (formerly 160A), 154 (formerly 169)
   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 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:
2. Logic and philosophy of science: 50 (formerly 57), 60, 61, 150 (formerly 159), 151 (formerly 160A), 154 (formerly 169), 156, 162-168
3. Ethics and value theory: 170-173
4. Epistemology, metaphysics, and philosophy of language: 180-189
5. History of philosophy: 100-103
6. 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: 52, 62, 101, 167, 212, 238, 245, 271, 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

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. Information about applying is available from Graduate Admissions in the Registrar's Office. The application deadline for Philosophy is January 10.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAMS IN PHILOSOPHY

The department is prepared to direct and supervise individual study and research to supplement instruction offered in the courses listed below. In addition, advanced seminars not listed in the catalog are frequently organized in response to student interest. Candidates for advanced degrees are urged to discuss their entire program of study with their department advisers as early as possible.

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.

MASTER OF ARTS IN PHILOSOPHY

University requirements for the M.A. are discussed in the "Graduate Degrees" section of this bulletin.

Four 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. The application deadline is March 28 of the academic year preceding entry into the program. In exceptional circumstances, consideration may be given to applications received after the March 28 deadline but before April 30. No fellowships are available. Entering students must meet with the director of the master's program and have their advisers' 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

Each master's candidate must take at least two courses numbered above 200 (these cannot be graduate sections of undergraduate courses). One may be a graduate core seminar (360, 370, 380, 381), but no student is admitted to a core seminar before completing undergraduate requirements in the area of the seminar and securing the approval of the instructor.

3. *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

The University's basic requirements for the Ph.D. degree (residence, dissertation, examination, and so on) are discussed in the "Graduate Degrees" section of this bulletin. The requirements detailed here are department requirements.

All courses used to satisfy proficiency requirements must be passed with a letter grade of 'B-' or better (no satisfactory/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. *Course requirements*—To be completed during the first two years:
   a. four core graduate courses and seminars in philosophy of language (381); philosophy of mind, metaphysics, and epistemology (380); value theory (370); and philosophy of science (360)
   b. three of the four items listed below:
      1. three history courses, each consisting of an approved graduate-level course in the history of philosophy. Courses satisfying this seven-out-of-eight requirement must include at least one history course in ancient philosophy, one in modern.
      1. PHIL 151 (formerly 160A)
   c. PHIL 150 (formerly 159) or the equivalent
   d. A total of at least 49 units of course work in the Department of Philosophy numbered above 110, but not including Teaching Methods (PHIL 239) or affiliated courses. Units of Individual Directed Reading (PHIL 240) may be included only with the approval of the Director of Graduate Study.
2. *Teaching Assistance*—A minimum of five quarters of teaching assistance, usually during the second and third years. As part of the training for being a teaching assistant, Ph.D. students are required to take PHIL 239 during Spring Quarter of their first and second years.
3. *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 requirements.
4. During the third year of graduate study, and after advancement to candidacy, a Ph.D. student should complete at least three graduate-level courses/seminars, at least two of which must be in philosophy. Courses required for candidacy are not counted toward satisfaction of this requirement. Choice of courses/seminars outside philosophy is determined in consultation with a student's adviser.
5. During the summer of their second year, students are required to attend a dissertation development seminar given by the department.
6. Dissertation work and defense: the third and fourth (and sometimes fifth) years are devoted to dissertation work.
   a. *Dissertation Proposal*—By Spring Quarter of the third year, students select a dissertation topic, a reading committee, and some possible thesis relative to that topic. The topic and thesis should be sketched in a proposal of three to five pages, plus a detailed, annotated bibliography indicating familiarity with the relevant literature. The proposal should be approved by the reading 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 the student, thesis, topic, and adviser make a reasonable fit. In cases where such an exam is deemed inappropriate by the reading committee, the student may be exempted by filing a petition with the Director of Graduate Study, signed by the student and the members of the reading committee.
   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 three-person reading committee at least one month before the student expects to defend the thesis in the University oral exam. If the student is given permission to go forward, the University

orals 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 can 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. 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 additional item from the items listed above in requirement 1(a)
2. PHIL 150 (formerly 159); but in this case, a student must take PHIL 50 (formerly 57)

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 l(d), the Philosophy unit requirement for the first two years. Normally this requirement is not reduced below 32 units.

INTERDEPARTMENTAL PROGRAMS

PH.D. IN PHILOSOPHY AND HUMANITIES

The Department of Philosophy also participates in the Graduate Program in Humanities leading to the Ph.D. degree in Philosophy and Humanities. It is described in the "Interdisciplinary Studies in Humanities" section of this bulletin.

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 that 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.

Courses of Study—The program consists of two years of courses and two years of dissertation work. Students are required to take the following courses in the first two years:

1. Six philosophy courses:
   a. two of the following: 360, 370, 380, 381
   b. one course in the history of modern philosophy
   c. two quarters of graduate logic courses from among 350A, 351A, 352A, 353A
   d. at least one additional seminar in the general area of symbolic systems: such as, 354, 358
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 239
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 are the same as for other third-year graduate students in philosophy: a dissertation proposal, creation of a dissertation committee, and at least three approved graduate courses and seminars. 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.

The requirement for the fourth year is the same as for the other graduate students in philosophy: a department oral on an initial draft of part of the dissertation, a fourth year colloquium, and a University oral exam when the dissertation is essentially complete.

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 specialization 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 1.a.2.

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.

GRADUATE FELLOWSHIPS AND ASSISTANTSHIPS

A limited amount of fellowship support is available for Ph.D. students in philosophy. Students request aid by checking the relevant box on the application form. Details of this program may be obtained from the department. Note that a condition of financial aid may be teaching assistance that goes beyond the Ph.D. requirement.

The following courses may be used to fulfill some of the requirements. The adviser can approve additional courses.

CLASSHIS 101. The Greeks
CLASSHIS 133. Classical Seminar: Origins of Political Thought
CLASSHIS 137/237. Models of Democracy (Same as COMM 212/312, POLISCI 237/337.)
CLASSHIS 333. Classical Seminar: Origins of Political Thought
CLASSGRK 113. Advanced Greek: Thucydides
CLASSGEN 22N. Technologies of Civilization: Writing, Number, and Money
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 136R. Introduction to Global Justice
ETHICSOC 179M. Libertarianism, Egalitarianism, and Public Policy
ETHICSOC 181M. The Ethics of Risk
GERGEN 246/346. Being at Home in the World: Kant's Critique of the Power of Judgment
GSBGEN 382. Thinking Like a Lawyer
HPS 154. What is Science? Explaining Nature from Pythagoras to Popper
HUMNTIES 321. Classical Seminar: Origins of Political Thought
IPS 206A. Politics and Collective Action
INTNLREL 136R. Introduction to Global Justice
LAWGEN 206. Thinking Like a Lawyer
MATH 161. Set Theory
POLISCI 132. Ethics of Political Animals
POLISCI 136R. Introduction to Global Justice
POLISCI 230A/330A. Classical Seminar: Origins of Political Thought
POLISCI 331S. Politics and Collective Action
POLISCI 332R,S. Greek Political Economy I,II
POLISCI 336. Introduction to Global Justice
POLISCI 436. Rational Choice
PUBLPOL 204A. Politics and Collective Action
RELIGST 278/378. Heidegger: Hermeneutics of the Self

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.

PHYSICS

Emeriti: (Professors) Steven Chu, Alexander I. Fetter,* Stanley S. Hanna, William A. Little, David M. Ritson, H. Alan Schwettman, Robert V. Wagoner, John Dirk Walecka, Mason R. Yearian; *(Professors, Research)* Todd I. Smith,* John P. Turneaure; *(Professors, Courtesy)* Peter A. Sturrock (Applied Physics), Richard Taylor (SLAC)
Chair: Patricia Burchat
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, Stanley G. Wojcicki, Shoucheng Zhang
Associate Professors: Tom Abel, Steven Allen, Sarah Church, David Goldhaber-Gordon, Kathryn Moler
Assistant Professors: Stefan Funk, Chao-Lin Kuo, Hari Manoharan, Risa Wechsler
Professors (Research): John A. Lipa, Phillip H. Scherrer
Courtesy Professor: Richard N. Zare
Lecturer: Rick Pam
Consulting Professors: Gerald Fisher, Barbara Jones, Greg Madejski, Alan Title
Visiting Professors: Francois LeDiberder, Jaemo Park, Sandip Trivedi

* Recalled to active duty.

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Web Site: http://www.stanford.edu/dept/physics

Courses offered by the Department of Physics have the subject code PHYSICS, and are listed in the "Physics (PHYSICS) Courses" section of this bulletin.

The Russell H. Varian Laboratory of Physics, the new Physics and Astrophysics Building, the nearby 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 Stanford Linear Accelerator Center (SLAC) 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 accelerator that can accelerate electrons and positrons. Until very 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. Construction of the world's first x-ray free electron laser, called the Linac Coherent Light Source, is nearing completion at SLAC. The facility is expected to be operational in 2009.

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, a new interdisciplinary biological sciences, medicine, and bioengineering laboratory.

The Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), formed jointly with the Stanford Linear Accelerator

Center (SLAC), provides a focus for theoretical, computational, observational, and instrumental research programs, including the Gamma Ray Large Area Space Telescope (GLAST), the Large Synoptic Survey Telescope (LSST) and the Super Nova Acceleration Probe (SNAP). 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 (cryogenic dark matter search) experiment is operated in an underground laboratory on the Stanford campus and in the Soudan mine in Minnesota. Stanford is taking a lead role in the EXO-200 double-beta decay experiment that is expected to start taking data in 2008 at a deep underground site in southern New Mexico. These are research opportunities for students in this growing interdisciplinary field.

The Stanford Institute for Theoretical Physics is devoted to the investigation of the basic structure of matter (string theory, M-theory, quantum cosmology, condensed matter physics).

The Physics Library, a center for the reading and study of physics and astronomy at all levels, includes print and electronic access to current subscriptions and back sets of important journals together with textbooks, dissertations, scholarly monographs, and the collected works of the most eminent physicists.

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 Course 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 honors program and/or the summer research program.

Graduate students find opportunities for research in the fields of astrophysics, particle astrophysics, cosmology, experimental particle physics, theoretical particle physics, 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 16 for the following Autumn Quarter. Graduate students may normally enter the department only at the beginning of Autumn Quarter.

UNDERGRADUATE PROGRAMS IN PHYSICS

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 meet the needs mainly 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 the biological sciences. 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.

BACHELOR OF SCIENCE IN PHYSICS

A calculus-based entry-level series is required, either PHYSICS 61, 63, 64, 65, 67, or 41, 43, 44, 45, 46 (or preferably 67 rather than 44). Students who take the PHYSICS 40 series take PHYSICS 70, which covers the foundations of modern physics. This material is incorporated into the PHYSICS 60 series beginning in 2005-06. Students taking the PHYSICS 60 series in 2005-06 or after do not take PHYSICS 70; instead, they must take one advanced Physics elective (100-level or higher). In addition, the following more advanced courses are required: PHYSICS 105, 107 (WIM), 108, 110, 120, 121, 130, 131, 170, and 171; MATH 51, 52, 53, 131; one additional Mathematics course numbered 100 or higher, or PHYSICS 112. MATH 51H, 52H, and 53H may substitute for MATH 51, 52, and 53. It is strongly 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, 153A,B, 160, 161, 172, 204 and EE 268. PHYSICS 113 is designed to be taken in parallel with 110. The department advises the study of some computer science such as CS 106. Mathematics and Physics courses taken to satisfy the department's major requirements cannot be taken on a credit/no credit basis. Prospective Physics majors are also advised to take PHYSICS 59, Current Research Topics, in their freshman or sophomore year.

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 with significant advanced preparation in physic beyond AP Physics C or A-levels should make an advising appointment before the start of classes to determine appropriate placement.

For advanced placement advice, see http://registrar.stanford.edu/students/academics/adv_place.htm.

Undergraduates are offered help with physics problems in the Physics Tutoring Center, which is staffed Monday through Friday.

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 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 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: Exp. Techniques (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 131. 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		
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, but 113 and 134 are recommended for students who intend to complete a Ph.D. in Physics.

** Those wishing to do physics theory 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.

A. APPLIED PHYSICS (HARI MANOHARAN)

At least four, one quarter courses chosen from the following courses, or three courses plus an honors thesis:

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 an honors 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)

At least four, one quarter courses chosen from the following courses, or three courses plus an honors thesis:
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 273. Algorithms for Structure and Motion In Biology

It is recommended that Physics majors interested in pursuing a career in biophysics consider a minor in Biology.

D. GEOPHYSICS (SIMON KLEMPERER, GEOPHYSICS)

At least four, one quarter courses chosen from the following courses, or three courses plus an honors thesis:
EE 140. Introduction to Remote Sensing
GEOPHYS 112. Exploring Geosciences with MATLAB
GEOPHYS 150. General Geophysics and Physics of the Earth
GEOPHYS 170. Global Tectonics
GEOPHYS 180. Geophysical Inverse Problems
GEOPHYS 190. Introduction to Geophysical Field Methods
GEOPHYS 222. Reflection Seismology
GEOPHYS 262. Rock Physics
GEOPHYS 288A. Crustal Deformation

E. THEORETICAL PHYSICS (ANDREI LINDE)

At least four, one quarter courses chosen from the following courses, or three courses plus an honors thesis:
PHYSICS 152A,B. Introduction to Particle Physics
PHYSICS 153A,B. Introduction to String Theory
PHYSICS 204. Advanced Seminar in Theoretical Physics
PHYSICS 212. Statistical Mechanics
PHYSICS 232. Special Topics in Quantum Mechanics
PHYSICS 260. Introduction to Astrophysics and Cosmology
PHYSICS 262. Introduction to Gravitation
PHYSICS 330,331,332. Quantum Field Theory
PHYSICS 351,352. Elementary Particle Physics
PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology
PHYSICS 364. Advanced Gravitation

Notes to students taking this concentration:
1. No more than one of the courses should be taken for CR/NC.
2. Students should discuss the choice of courses with members of the Institute for Theoretical Physics and/or their major adviser.
3. Students may attend 330 after taking 130, 131. Prior study of special topics in quantum mechanics (134, 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 45-47 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: 94-105. Students interested in this program should consult Professor Patricia Burchat (burchat@stanford.edu, 725-5771), and Professor Rachel Lotan, director of the STEP Coterminal Teaching Program in the School of Education (rlotan@stanford.edu).

CORE PHYSICS COURSES:

Mechanics:	*Units*
PHYSICS 41. Mechanics	
or PHYSICS 61. Mechanics and Special Relativity	4
Heat:	
PHYSICS 45. Light and Heat	
PHYSICS 46. Light and Heat Lab	
or	
PHYSICS 65. Thermodynamics & 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	46-48

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	94-105

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.

HONORS PROGRAM

The department offers a program leading to the degree of Bachelor of Science in Physics with honors as follows:

1. Students must submit an Honors Program Proposal form to the undergraduate program coordinator once they find a physics project, either theoretical or experimental, in consultation with individual faculty members. Proposal forms are available from the Physics undergraduate office and must be submitted by November 1 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. The work done in the honors program may not be used as a substitute for regular required courses.
3. A written report and a presentation of the work at its completion are required for honors. By mid-May, the honors candidate is required to present the project at the department's honors presentations. This event is publicized and open to the general public. The expectation is that the student's adviser, second reader, and all other honors candidates attend.
4. The decision as to whether a given independent study project does or does not merit award of honors is made jointly by the student's honors adviser and the second reader for the written thesis. This decision is based on the quality of the student's honors work and other work in physics.

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, 43/44, 45/46 and PHYSICS 70	18
or	
PHYSICS 61, 63/64, 65/67	15
at least three PHYSICS courses numbered 100 or above	9-12
Total	27-30

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.

GRADUATE PROGRAMS IN PHYSICS

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. Information on application procedures is mailed with the admission information.

TEACHING CREDENTIALS

For information on teaching credentials, consult the "School of Education" section of this bulletin or visit http://suse-step.stanford.edu. Also see the earlier 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.

DOCTOR OF PHILOSOPHY

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 (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, Charles Drekmeier, Elisabeth Hansot (*Senior Lecturer*), John W. Lewis, John Manley, James March, Hubert R. Marshall, Daniel Okimoto, Robert A. Packenham, Philippe Schmitter, Robert Ward, Hans N. Weiler
Chair: James D. Fearon
Professors: David W. Brady, Joshua Cohen, James D. Fearon, John A. Ferejohn (on leave Spring), Morris P. Fiorina, Judith L. Goldstein, Stephen H. Haber (on leave), David J. Holloway, Shanto Iyengar, Simon D. Jackman, Terry L. Karl, Stephen D. Krasner, Jon A. Krosnick, David D. Laitin (on leave), Michael A. McFaul, Terry M. Moe, Josiah Ober, Jean C. Oi, Jack N. Rakove, Condoleezza Rice (on leave), Douglas Rivers (on leave Fall), Scott D. Sagan (on leave), Gary M. Segura, Paul M. Sniderman, Barry R. Weingast
Associate Professors: Rob Reich, Jonathan A. Rodden, Kenneth A. Schultz, Michael R. Tomz
Assistant Professors: Lisa Blaydes (on leave), Alberto Díaz-Cayeros, Karen L. Jusko, Phillip Y. Lipscy, Beatriz Magaloni, Peter Stone, Jonathan Wand, Jeremy Weinstein (on leave)
Professor (Research): Norman H. Nie
Lecturers: Tammy Frisby, Francisco Monaldi, Seo-Hyun Park, Andrew R. Rutten, Kathryn Stoner-Weiss
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, Saumitra Jha *(Assistant Professor)*, Keith Krehbiel, Neil A. Malhotra *(Assistant Professor)*, Debra M. Satz, Ken Shotts *(Associate Professor)*, Stephen J. Stedman
Visiting Professors: Josef Joffe, Abbas Milani
Visiting Associate Professor: Alice Miller
Visiting Assistant Professor: Alex Montgomery
Acting Instructors: Alex Kuo, Avia Pasternak

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 have the subject code POLISCI, and are listed in the "Political Science (POLISCI) Courses" section of this bulletin.

UNDERGRADUATE PROGRAMS IN POLITICAL SCIENCE

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.html. 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 in 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 POLISCI 150A, 150B, 150C, 151A, 151B, ECON 102A, or STATS 60. The list of courses satisfying the methods requirement is updated annually by the department. Students should consult the Bulletin for new courses that satisfy this requirement.

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. 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 apply a maximum of 10 units from Stanford Summer Session or courses outside Stanford, including Stanford-in-Washington and Overseas Programs. Transfer students are allowed up to 20 units of transfer credit or Summer Session. 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 and may only be applied towards related course work units.
   Courses counting toward the 70-unit requirement must be taken for a letter grade, although units in excess of the required 70 may be taken on a credit/no credit basis. A minimum grade of 'C' is required for courses to count towards major requirements.

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,1B. Introductory Economics A,B
EDUC 260X. Understanding Statistical Models and their Social Science Applications (Same as HRP 239, STATS 209.)
ETHICSOC 181M. The Ethics of Risk
ETHICSOC 185M. Contemporary Moral Problems
HISTORY 150A. Colonial and Revolutionary America
HUMBIO 171. The Death Penalty: Human Biology, Law, and Policy
HUMBIO 172A/B. Children, Youth, and the Law
INTNLREL 140B. Theories of International Law
INTNLREL 206. Palestinian Nationalism, Past and Present
INTNLREL 207. Tribe, State, and Society in the Modern Middle East
IPS 206B. Organizations (Same as PUBLPOL 204B.)
IPS 243. The History, Science, Technology, and Politics of Missile Defense
MS&E 193/193W/293. Technology and National Security
OSPBEIJ 47. Institutional Change in Reform China
OSPBEIJ 66. Essentials of China's Criminal Justice System
OSPBER 115X. The German Economy: Past and Present
OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU
OSPBER 15. Shifting Alliances? The European Union and the U.S.
OSPFLOR 106V. Italy: From Agrarian to Postindustrial Society
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?
OSPKYOTO 215X. The Political Economy of Japan
OSPKYOTO 24. Japan in Contemporary International Affairs
OSPMOSC 72. Space, Politics, and Modernity in Russia
OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration
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
OSPPARIS 122X. Challenges of Integration in the European Union
OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France
OSPPARIS 57. Human Rights in Comparative Perspective
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
PUBLPOL 102. Organizations and Public Policy
PUBLPOL 183. Philanthropy and Social Innovation
REES 105/205. Central and East European Politics
REES 320. State and Nation Building in Central Asia

HONORS PROGRAM

The honors program offers qualified students an opportunity to conduct independent research, write a thesis summarizing their findings, and make a presentation of their work. During the process of research, analysis, thinking, drafting, rethinking, and redrafting, students work closely with a faculty adviser and their fellow students.

Applicants must have a 3.5 grade point average (GPA) in Political Science courses, and an adviser who must be a member of the academic council. Students are required to declare their intention to pursue honors on the Major Proposal form. Applications can be obtained from the department office.

Students pursuing honors must complete the following by the end of Spring Quarter of their junior year: Methods requirement (POLISCI 150A,B,C, 151A, 151B, STATS 60, or ECON 102A), WIM requirement, and a completed research paper from an advanced undergraduate seminar or directed reading. Students are required to enroll in one quarter of POLISCI 299Q, Junior Research Seminar, in the junior year. This credit/no-credit course is designed to help students find a manageable thesis topic and adviser.

Students who are accepted into the program should plan to make the thesis the focus of their senior year. They should enroll in POLISCI 299A,B,C, which covers research and writing directed by the student's adviser. In addition, students must enroll in POLISCI 299R, a 3-unit Autumn Quarter seminar designed to develop research and writing skills. In the Winter Quarter, students must enroll in POLISCI 299S which is a credit/no credit tutorial in which students work with other students and tutors to finish their research.

Most students find themselves in one of two groups: (1) those who already have substantial background in their thesis topic, and can expect to complete the honors program in two or three quarters for a total of 10-15 units completed in POLISCI 299A,B,C; or (2) those who have little or no previous work on the topic, and can expect to complete the program in three quarters with 15 units of work.

To complete the honors program, students must:

1. Complete all requirements for the major.
2. Enroll in one quarter of POLISCI 299Q, 299R, and 299S.
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, POLISCI 299R, Senior Research Seminar, or POLISCI 299S, Senior Honors Tutorial, 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 crosslisted in the Department of Political Science. A student may petition for a maximum of 5 units of directed reading which must be supervised by a faculty member of the department.

All units are for a letter grade. A minimum grade point average (GPA) of 2.0 (C) is required for courses to count towards minor requirements.

Concentration—The student selects a subfield in which three courses are taken. One of these courses is the introductory course, the other two at a more advanced level (numbered above 100). Where a linked set of advanced courses is offered, as with the Political Theory 130A,B,C series, the introductory course need not be taken.

The concentration corresponds to one of the subfields the department already has in place, namely, international relations, American politics, political theory, and comparative politics.

Distribution—Three courses must be in the area of 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. A final 5 units may in any related subfield.

Transfer Work—A maximum of 10 units of work completed outside Stanford may be given Political Science credit toward the minor for transfer students. A maximum of 5 units of work completed in Stanford Summer Session or outside of Stanford for non-transfer students may be given Political Science credit toward the minor. All such cases must be individually reviewed and approved by the Director of Undergraduate Studies.

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 in an English-speaking country. For details concerning these tests, see the Guide to Graduate Admission, available at http://gradadmissions.stanford.edu. The application deadline is December 2. 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.

MASTER OF ARTS IN POLITICAL SCIENCE

The M.A. degree may be pursued as part of a joint degree program with one of the University's professional schools. Students interested in a joint degree should apply for admission to the M.A. program in Political Science during the Autumn Quarter of the first year in the Stanford professional school.

Doctoral candidates and students enrolled in professional schools who have been admitted to the joint degree 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. Of the remaining 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 reading and all course work.

The department does not offer a coterminal bachelor's and master's degree.

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, political institutions, and political theory. Upon petition, a special field (for example, public law, or urban politics) may be offered as a third concentration. 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 six 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. Completion of special concentrations may require more than 10 units of course work. Students are not permitted to use the following combination of concentrations for the purposes of fulfilling the requirements for the PhD: American politics, political institutions, and methodology. Students wishing to concentrate in American politics, political institutions, and methodology are not prohibited from doing so, but must add another field of concentration to their course of study.
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 methods 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 first-year 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 Admission to Candidacy for the Ph.D. 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 is submitted by the student to a thesis committee of three faculty members, including the principal adviser. The dissertation proposal requires approval 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 offering 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.

PSYCHOLOGY

Emeriti: (Professors) Gordon H. Bower, John H. Flavell, Albert H. Hastorf, Eleanor E. Maccoby, Roger N. Shepard, Barbara Tversky, Robert B. Zajonc, Philip G. Zimbardo, Lyn K. Carlsmith
Chair: Brian Wandell
Professors: Albert Bandura, Laura L. Carstensen, Herbert H. Clark, Carol Dweck, Ian H. Gotlib, Leonard M. Horowitz, John D. Krumboltz, Mark R. Lepper, Ellen M. Markman, Hazel R. Markus, James L. McClelland, Dale Miller, Lee D. Ross, Claude M. Steele, Ewart A. C. Thomas, Brian Wandell, Jeffrey J. Wine
Associate Professors: Jennifer L. Eberhardt, Anne Fernald, James J. Gross, Brian Knutson, Benoît Monin, Jeanne L. Tsai, Anthony Wagner
Assistant Professors: Lera Boroditsky, Kalanit Grill-Spector, Susan C. Johnson, Samuel M. McClure, Michael Ramscar, Gregory M. Walton
Associate Professor (Teaching): Catherine Heaney
Lecturers: Amie Haas, Bridgette Martin-Hard, Beverly Hartman, Jeanne Lepper, Adrienne Lomangino, Teceta Thomas Tormala
Courtesy Professors: William C. Dement, Gary H. Glover, Jon Krosnick, William T. Newsome, Anne C. Petersen, Richard J. Shavelson
Director, Bing Nursery School: Jeanne Lepper
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 have the subject code PSYCH, and are listed in the "Psychology (PSYCH) Courses" section of this bulletin.

The courses and research opportunities in the Department of Psychology introduce students to the corpus of data on, and explanations of, human nature and human 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 research programs of the faculty and students focus on the study of basic psychological mechanisms and, where appropriate, on relating basic research to the analyses and solutions of important societal problems.

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 (1) courses designed for the general student, (2) 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, (3) a minor program, (4) a coterminal master's degree program leading to the degree of Master of Arts, and (5) programs of graduate study and research leading to the degree of Doctor of Philosophy. Applications are not accepted for the master's degree except as noted below.

UNDERGRADUATE PROGRAMS IN 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, or a comparable Statistics course. 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 Personality Psychology
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.

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 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 may use only 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.

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 (1) excellent academic performance, (2) previous research experience, and (3) 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 by April 1, 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. Initially, discussions are on general methods and issues in psychological research, but most of the sessions are devoted to discussions of students' presentations of their proposed research. During the quarter, students meet with their advisers to develop their experimental program and begin data collection. At the end of Autumn Quarter, students turn in a written proposal. 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, scheduled for the day between classes and exams. 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.

GRADUATE PROGRAMS IN PSYCHOLOGY

COGNITIVE SCIENCE PROGRAM

Psychology participates, along with the departments of Computer Science, Linguistics, and Philosophy, and the School of Education, in an interdisciplinary program of cognitive science. The program is intended to provide students with an interdisciplinary education as well as a deeper concentration in psychology. Doctoral students in Psychology are eligible to participate in the cognitive science program. Students who complete the requirements receive a special designation in cognitive science along with the Ph.D. in Psychology. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside psychology. For information or course approval, contact the student services office.

PSYCHOLOGY COLLOQUIUM

The Psychology Colloquium meets on most Wednesday afternoons at 3:45 pm. Speakers from Stanford and other institutions present topics of current interest. Graduate students are expected to attend. Additional announcements may be found at http://psychology.stanford.edu/events_colloquium.html.

MASTER OF ARTS IN PSYCHOLOGY

The Department of Psychology normally 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. Admission to the program is by Psychology faculty nomination only. 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.

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, and (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 January 12.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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 Committee on Graduate Studies. 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, or approved by the department, who agrees to supervise the student's research. Students in the program may be terminated at the beginning of the Winter Quarter 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. Memory and Learning
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. Personality and Psychopathology
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

In exceptional cases, students concurrently enrolled in another doctoral or professional program at Stanford may also apply for the M.A. degree. Such applicants also consult with the student services office.

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 list following:

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. Personality

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., normally 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. The deadline for filing this report is the first Monday of June.

Second Year Course Requirements—By the end of the second year of graduate study, the student must 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 must meet no later than the first 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 education 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 research committee and one oral examination committee chair from outside of 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. The report is due on the first Monday of June. 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 Evaluation—A similar evaluation is conducted at the end of the second year of graduate training involving the same criteria as the first year; however, the student is not required to submit a paper. Students who do not make satisfactory progress during the second year may be dropped from the program.

THE DOCTORAL TRAINING PROGRAM

As indicated by the requirements described above, a student must concentrate 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 people or animals 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 normally takes no more than 10 units of course work per quarter.

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.

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 satisfactory/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)
Acting Assistant Professor and Director of Practicum: Mary Sprague (Public Policy)
Executive Committee: Laurence Baker (Medicine), Jonathan Bendor (Business), David Brady (Political Science, Hoover Institution), Timothy Bresnahan (Economics), Samuel Chiu (Management Science and Engineering), Morris Fiorina (Political Science), Judith Goldstein (Freeman Spogli Institute for International Studies, Political Science), David Grusky (Sociology), Stephen Haber (Political Science, Hoover Institution), Eric A. Hanushek (Hoover Institution), Deborah Hensler (Law), Daniel Kessler (Business, Law), David Kreps (Business), Roger Noll (Stanford Institute for Economic Policy Research), Leonard Ortolano (Civil and Environmental Engineering), Bruce Owen (Stanford Institute for Economic Policy Research), Sean Reardon (Education), Lee Ross (Psychology), Gregory Rosston (Stanford Institute for Economic Policy Research), Debra Satz (Philosophy), John B. Shoven (Stanford Institute for Economic Policy Research, Economics, Hoover Institution), Stephen Stedman (Freeman Spogli Institute for International Studies)
Affiliated Faculty: Donald Barr (Sociology), Jayanta Bhattacharya (Medicine), Coit Blacker (Freeman Spogli Institute for International Studies), Paul Brest (Law), Jeremy Bulow (Graduate School of Business), John Cogan (Hoover Institution), Eamonn Callan (Education), Martin Carnoy (Education), Joshua Cohen (Political Science), Paul David (Economics), Lynn Eden (Freeman Spogli Institute for International Studies), Lawrence Friedman (Law), Lawrence Goulder (Economics, Freeman Spogli Institute for International Studies), Thomas C. Heller (Law, Freeman Spogli Institute for International Studies), Nicholas Hope (Stanford Center for International Development), Jon A. Krosnick (Communications, Political Science), Thomas MaCurdy (Economics), Mark McClellan (Economics, School of Medicine; on leave), Robert McGinn (Management Science and Engineering), Milbrey McLaughlin (Education), Terry Moe (Political Science), Norman Nie (Political Science), A. Mitchell Polinsky (Law, Stanford Institute for Economic Policy Research), Jeff Strnad (Law), Barton Thompson (Law), Michael Tomz (Political Science), David Victor (Law), Greg Walton (Psychology), Jonathan Wand (Political Science), Barry Weingast (Political Science), Frank Wolak (Economics)
Lecturers: Laura Arrillaga (Graduate School of Business), Ward Hanson (Stanford Institute for Economic Policy Research), Tammy Frisby (Political Science), Jonathan D. Greenberg (Law), Adrienne Jamieson (Stanford in Washington), Anjini Kochar (Stanford Institute for Economic Policy Research), Eva Meyersson Milgrom (Stanford Institute for Economic Policy Research), Joe Nation, Teceta Thomas Tormala (Psychology), Scott Wallsten (Stanford in Washington), Patrick Windham
Teaching Fellows: Brent Durbin, Kirsten Oleson

Program Office: Encina Hall West, Room 204
Mail Code: 94305-6050
Program Phone: (650) 725-0109
Web Site: http://www.stanford.edu/dept/publicpolicy

Courses offered by the Public Policy Program have the subject code PUBLPOL, and are listed in the "Public Policy (PUBLPOL) Courses" section of this bulletin.

The undergraduate Public Policy curriculum is intended to expose students to the basic 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. Although the concepts and tools are of wider applicability, the institutional context is chiefly American. Economics and quantitative analyses are central to but not sufficient for modern public policy analysis; political science, law, philosophy, organizational behavior, and cognitive 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.

UNDERGRADUATE PROGRAMS IN PUBLIC POLICY

The undergraduate Public Policy curriculum is intended to expose students to the basic concepts and tolls used in evaluating public policy options and outcomes, and to prepare students for entry-level positions in organizations concerned with such analysis. Although the concepts and tools are of wider applicability, the institutional context is chiefly American. Economics and quantitative analyses are central to but not sufficient for modern public policy analysis; political science, law, philosophy, organizational behavior, and cognitive 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.

The Public Policy Program offers a Bachelor of Arts, an honors program, and a minor for undergraduates.

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 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:
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 program in Public Policy requires 87 units of course work.

1. *Preparatory courses (44 units)*—POLISCI 2; 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, receiving a score of at least 4 on the Advanced Placement exam in U.S. government and politics (which appears on your Stanford transcript), or passing a

diagnostic exam administered by the Public Policy Program. ECON 50 and 51 must be taken for a letter grade. A maximum of 10 units of the other prerequisite courses may be taken as credit/no credit.

2. *Core courses*—A 25-unit sequence of 5-unit PUBLPOL courses (101, 102, 103A, B, or C, 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 a concentration. The post-core course work must be approved by a faculty adviser and the director. Concentration course work must be completed for a letter grade.
4. Seniors are required to participate in one quarter (at least 3 units) of the Senior Seminar (PUBLPOL 200A, B, or C). Majors also must submit at least one research paper during the senior year and present it during the Senior Seminar. The senior paper may be a term paper or report for either the senior seminar or another course, or an honors thesis. PUBLPOL 200B (Winter Quarter) is organized as a 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. The senior seminar must be completed for a letter grade.
5. Students must complete the Public Policy core, concentration area courses and the senior seminar 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. Application 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 area courses; the Senior Seminar; PUBLPOL 199, Senior Research; and PUBLPOL 105. Students are encouraged to complete PUBLPOL 105 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 advisor. 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 hard copy and electronic forms. All other theses must be submitted by the last Friday in May in both hard copy 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, 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 a 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 or in the program office. The student must obtain the sponsorship of a faculty member who approves of the thesis description and who 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 Director of the Public Policy Program. 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 core faculty in Public Policy are available to provide assistance in selecting a senior thesis topic and adviser.

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 103A or B or C	5
PUBLPOL 104	5
PUBLPOL 106	5

* The U.S. government and politics requirement can be fulfilled by taking POLISCI 2, receiving a score of at least 4 on the Advanced Placement exam in U.S. government and politics (which appears on the Stanford transcript), or passing a diagnostic exam administered by the Public Policy Program.

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 103A or B or C	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 103A or B or C	5
PUBLPOL 104	5
PUBLPOL 106	5

GRADUATE PROGRAMS IN PUBLIC POLICY

University requirements for the master's degree are described in the "Graduate Degrees" section of this Bulletin.

The Graduate Program in Public Policy offers two master's degrees: Master in Public Policy (M.P.P.), a two-year program leading to a professional degree, and 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 in Public Policy (J.D./M.P.P); Juris Doctor with an M.A. in Public Policy (J.D./M.A.); Doctor of Philosophy in Economics, Education,

Psychology, or Sociology with a Master in Public Policy (Ph.D./M.P.P); Master of Business Administration with a Master in 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.). Requirements for the joint degrees differ from completing the two degrees separately; details are available from the program office and on the program web site.

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 human values that often animate policy debate. After completing the graduate core curriculum, students apply these skills by focusing their studies in a 2-quarter practicum for the M.P.P., or a 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.

ADMISSIONS

Applications for graduate study in Public Policy are accepted only from Stanford students currently enrolled in any 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.B.A., or J.D.), indicating an interest in the M.P.P. joint degree program; applicants admitted to the otherdegree program are then evaluated for admission to the M.P.P. 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 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 May 1.

PROGRAM REQUIREMENTS

The graduate program in Public Policy consists of a common core set of courses requiring approximately one year of study, plus a 10-unit practicum and concentration course work for the M.P.P., or a master's thesis for the M.A. in Public Policy. All graduate degree candidates must submit an acceptable official Master's Degree Program Proposal to the Public Policy office by the end of Autumn Quarter and must amend this proposal formally if plans for meeting the degree requirements change. The M.P.P. requires 90 units of course work and requires approximately two years. The M.A. requires 42 units of course work plus a 5-unit master's thesis, and requires approximately one year. The joint M.P.P. degree programs require 90 units of which up to 45 units may also count toward the other degree. The joint M.A./J.D. program requires 47 units of which up to 45 units may be counted toward the J.D. degree. The joint M.P.P. degree programs add approximately one additional year to the time required for the other degree. Each joint degree program differs in its extended core and concentration course requirements; details on specific degrees are available at the program office and on the web site.

The graduate Public Policy core curriculum is required for all its graduate degree programs. Core courses must be taken for a letter grade and must be completed with an overall grade point average (GPA) of 3.0 (B) or better. Students are expected to devote one year full-time to the M.P.P. core; for joint-degree students, typically this is during the second year at Stanford. Students are required to participate in the weekly colloquia series. Students for whom any given core course would duplicate prior studies may petition to substitute a more advanced course in the related subject matter.

Prerequisites—Graduate students in Public Policy are expected to be literate in mathematics, statistics, and economics at the level of MATH 41, ECON 50, and STATS 60 or ECON 102B.

Core curriculum consisting of the following courses—PUBLPOL 201A,B, 202A,B, 203A,B,C, 204A,B, 205A,B, 206 (M.P.P. students only), 207. (46 units for M.P.P.; 42 units for M.A. in Public Policy)

Practicum (M.P.P. students only)—10 units of PUBLPOL 209.

Concentration (M.P.P. students only)—Course work in a specialized field or fields, chosen from existing Stanford courses with the prior approval of the student's faculty adviser and the program director.

Master's Thesis (M.A. students only)—Students complete a 5-unit thesis by enrolling in PUBLPOL 299 and submitting the thesis to the Public Policy Program office in both electronic and hard copy no later than the last Friday in May.

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, Hester G. Gelber, Paul Harrison, Thomas Sheehan, Lee Yearley
Associate Professors: Shahzad Bashir, Charlotte Fonrobert, Brent Sockness
Assistant Professor: Behnam Sadeghi
Lecturers: Mark Gonnerman, Linda Hess, Akiba Lerner, Azim Nanji, Ariella Radwin, Jennifer Rapp
Acting Assistant Professor: Barbara Pitkin
Visiting Professors: David Carrasco, J. Rebecca Lyman, John MacRae
Visiting Associate Professor: Jennifer Rose
Affiliated Faculty: Jean-Pierre Dupuy (French and Italian), Maud Gleason (Classics), Jack Kollmann (Russian, East European and Eurasian Studies)

Department Offices: Building 70
Mail Code: 94305-2165
Phone: (650) 723-3322
Web Site: http://www.stanford.edu/dept/relstud

Courses offered by the Department of Religious Studies have the subject code RELIGST, and are listed in the "Religious Studies (RELIGST) Courses" section of this bulletin.

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 Stanford Center for Buddhist Studies; the Taube Center for Jewish Studies; the Abbasi Program in Islamic Studies; the Program in Medieval studies; Interdisciplinary Studies in Humanities, with which the department offers a graduate degree; and the Asian Religions and Cultures Initiative.

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 pursue academic careers and are routinely placed in the best universities and colleges in the country.

UNDERGRADUATE PROGRAMS IN RELIGIOUS STUDIES

The department offers a Bachelor of Arts major and minor 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 which 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.

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, Brent Sockness, in 70-72B. Sunny Toy, the undergraduate student services associate in 71K, can 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 taken in courses numbered above 100. Ten units out of the 60 may be taken for the grade of 'CR/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. Performing Religion (Winter/Spring sequence), or
   b. one course in each of the following categories: introduction to religious traditions (courses numbered 11-50) and academic approaches to 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. Language courses relating to students' study of religion within the department, such as Arabic, biblical Hebrew, New Testament Greek, Chinese, or Japanese, but not counted towards the University language requirement may, with departmental approval, 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 which 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 with more questions or from a new perspective, or 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.

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 under 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, Brent Sockness, in 70-72B. Sunny Toy, the undergraduate student services associate in room 71K, can 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. Performing Religion (Winter/Spring sequence), or
   b. one course in each of the following categories: introduction to religious traditions (courses numbered 11-50) and academic approaches to 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.)

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.

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 with 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 the RELIGST 290, Majors Seminar, or 304A or B, Theories and Methods, with consent of instructor. 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.

The following courses from other departments may be used in fulfillment of degree requirements. The student adviser can approve additional courses.

CLASSGEN 18. Greek Mythology
POLISCI 149S. Islam and the West
REES 130/330. WIth God in Russia: Orthodox Christianity in the 19th and 20th Centuries

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: East Asian religions, Christianity, Islam, Judaism, religious ethics, and modern Western religious thought. 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 (two quarters)
   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 which 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, Pedagogy, 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.
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 project 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 conducted by a committee of at least three faculty members of the department, one of whom is the adviser. Non-departmental faculty may be included.
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 the completed 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. Non-departmental faculty may be included.
   b. *Dissertation Committee*—The dissertation committee may be formed after acceptance of the dissertation proposal. It is composed of the principal adviser and at least two other member of the Academic Council. Non-departmental and non-Stanford faculty may serve as readers when approved by the Graduate Director.
9. *University Oral Examination*—This examination, required by the University of Ph.D. students, is a defense of the completed 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 who 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

Religious Studies participates in the Graduate Program in Humanities leading to the Ph.D. in Religious Studies and Humanities, described in the "Interdisciplinary Studies in Humanities" section of this bulletin.

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 304A,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.

RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

Emeriti: Terence L. Emmons, Joseph N. Frank, Alex Inkeles, Joseph Van Campen, Henry Rowen
Director: Gabriella Safran (Slavic Languages and Literatures, on leave Autumn)
Acting Director, Autumn: John B. Dunlop (Hoover Institution)
Professors: Lazar Fleishman (Slavic Languages and Literatures), Gregory D. Freidin (Slavic Languages and Literatures), David J. Holloway (History, Political Science), Terry Karl (Political Science), Nancy S. Kollmann (History), David Laitin (Political Science), Norman Naimark (History), William J. Perry (School of Engineering), Condoleezza Rice (Political Science, on leave) Aron Rodrigue (History), Scott D. Sagan (Political Science), Richard Schupbach (Slavic Languages and Literatures), Nancy B. Tuma (Sociology), Steven J. Zipperstein (History)
Professor (Research): Siegfried S. Hecker (School of Engineering)
Associate Professors: Shahzad Bashir (Religious Studies), Maria Gough (Art History), Monika Greenleaf (Slavic Languages and Literatures), Michael A. McFaul (Political Science), Gabriella Safran (Slavic Languages and Literatures), Amir Weiner (History)
Assistant Professors: Robert Crews (History), Branislav Jakovljevic (Drama), Pavle Levi (Film Studies), Bissera Pentcheva (Art History)
Senior Lecturers: Rima Greenhill (Slavic Languages and Literatures), Katherine Jolluck (History), Geoffrey Rothwell (Economics), Allen Weiner (School of Law)
Lecturers: Eugenia Khassina (Slavic Languages and Literatures), Jack Kollmann (Center for Russian, East European and Eurasian Studies), Alma Kunanbaeva (Anthropology), Alan Mikhail (History), Eric Morris (International Policy Studies), Edith Sheffer (History), Kathryn Stoner-Weiss (Political Science)
Courtesy Professor: Coit Blacker (Political Science)
Visiting Professors: Jane Curry (Center for Russian, East European and Eurasian Studies), Alan Timberlake (Slavic Languages and Literatures)
Visiting Associate Professor: Ewa Domanska (Anthropology)
Acting Assistant Professor: Asya Pereltsvaig (Linguistics)
Visiting Lecturer: Karla Oeler (Art History)
Affiliates: Michael B. Bernstam (Hoover Institution), Ana Bezic (Anthropology), Jasmina Bojic (International Relations), Robert Conquest (Hoover Institution), John B. Dunlop (Hoover Institution), Lynn Eden (Freeman Spogli Institute for International Studies), Irina Erman (Slavic Languages and Literatures), Christina Gathmann (Freeman Spogli Institute for International Studies), Christine Jojarth (Freeman Spogli Institute for International Studies), Gail Lapidus (Freeman Spogli Institute for International Studies), Marina Marcos (Slavic Languages and Literatures), Zhanara Nauruzbayeva (Anthropology), Ekaterina Neklyudova (Slavic Languages and Literatures), Olena Nikolayenko (Freeman Spogli Institute for International Studies), Bertrand Patenaude (Hoover Institution), Pavel Podvig (Freeman Spogli Institute for International Studies), Karen Rondestvedt (Stanford Libraries), Sonja Schmid (Freeman Spogli Institute for International Studies), John M. Shalikashvili (Freeman Spogli Institute for International Studies), Elizabeth Sherwood-Randall (Freeman Spogli Institute for International Studies), Anatol Shmelev (Hoover Institution), Maciej Siekierski (Hoover Institution), Wojciech Zalewski (Stanford Libraries)

Center Offices: Encina West, Rm. 217
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 have the subject code REES, and are listed in the "Russian, East European and Eurasian Studies (REES) Courses" section of this bulletin.

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 two interdisciplinary academic programs: an undergraduate minor and an M.A. graduate degree program. Information on center programs and 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 programs draw 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 and East Europe.

UNDERGRADUATE PROGRAMS IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

The center offers a minor in Russian, East European and Eurasian Studies.

Slavic Theme House—Slavianskii Dom (SlavDom), at 650 Mayfield Avenue, is an undergraduate residence which houses 50 students and offers a wide variety of opportunities to expand knowledge, understanding, and appreciation of Russia, the former Soviet Union, and Eastern Europe.

Overseas Studies Programs—Undergraduates interested in the study of languages, history, culture and social organization of the countries of Russia, Eurasia, and Eastern Europe can apply to study at the Stanford centers in Moscow and Berlin. Participation in these programs is encouraged and easily integrated into the REEES minor. Information about these programs is available at http://osp.stanford.edu.

MINOR IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

The minor in Russian, East European and Eurasian Studies (REEES) is an interdisciplinary area studies program that allows the participating student significant opportunity to select REEES courses in various departments according to his or her interests.

REQUIREMENTS

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.
2. At least four additional REEES courses, totaling at least 20 units.
3. The student's courses, core and additional, must be distributed among at least three disciplines. In addition to REEES courses in the departments of History, Political Science, and Slavic Languages and Literatures, REEES courses in departments such as Anthropology, Economics, and Sociology, when offered, may qualify. The CREEES academic coordinator determines which courses qualify for the minor.
4. A capstone experience in REEES, 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.

Foreign Language—The 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 the former Soviet Union or Eastern Europe (excluding German) may be counted towards the REEES minor, up to a maximum of 3 units per academic quarter, 9 units total.

Additional Information—The total number of courses applied to the REEES minor must be at least six, but the minor should total no more than 36 units. Courses counting towards the REEES minor may not be counted towards the student's major. Courses taken at Stanford overseas campuses (particularly the Moscow campus) may count towards the REEES minor, with the approval in each case of the CREEES academic coordinator; at least three courses for the minor must be taken in residence at Stanford.

Approval of CREEES Academic Coordinator—Students interested in pursuing the REEES minor should consult the CREEES academic coordinator. The minor is declared online using the Axess system. Students declaring the 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 academic coordinator.

Students pursuing the REEES minor work with the CREEES academic coordinator, who is responsible for determining that requirements for the minor are satisfied.

Core Courses for 2008-09—

ANTHRO 147A. Folklore, Mythology, and Islam
HISTORY 120A. Foundations of Modern Russia
HISTORY 120B. The Russian Empire
HISTORY 125. 20th-Century Eastern Europe
POLISCI 114D. Democracy, Development, and the Rule of Law (Same as IR 114D.)
REES 105. Central and East European Politics
SLAVGEN 146. History and Other Theories of Time and Action in the Great Russian Novel
SLAVGEN 147. The Age of War and Revolution: A Survey of Russian Literature and Culture, 1900-1950s
SLAVGEN 155. Anton Chekhov and the Turn of the Century
SLAVGEN 190. Tolstoy's *Anna Karenina* in Dialogue with Contemporary Philosophical, Social, and Ethical Thought (Same as Humanities 197F.)

Additional 2008-09 courses which may be counted for the minor—

ANTHRO 111A. Cultural Heritage in Post-Socialist Europe (Same as ARCHLGY 111.)
ANTHRO 126. Post-Socialist City
ANTHRO 148A. Nomads of Eurasia: Culture in Transition
ARCHLGY 111. Cultural Heritage in Post-Socialist Europe (Same as ANTHRO 111A.)
ARTHIST 245. Photographic Utopia Under Stalin
COMPLIT 115. Nabokov in the Transnational Context (Same as SLAVGEN 156.)
COMPLIT 119. Dostoevsky and His Times (Same as SLAVGEN 151.)
FILMSTUD 134A. Poetic Cinema: The Soviet School
HISTORY 20Q. Russia in the Early Modern European Imagination
HISTORY 22N. Images and Practices of Violence
HISTORY 103E. History of Nuclear Weapons (Same as POLISCI 116.)
HISTORY 137. The Holocaust
HISTORY 182A. The Ottoman Empire
HISTORY 221B. The Woman Question in Modern Russia
HISTORY 223. Art and Ideas in Imperial Russia
HISTORY 224B. Modern Afghanistan
HISTORY 229. Poles and Jews
HISTORY 299X. Design and Methodology for International Field Research
INTNLREL 166. Russia and Islam
MS&E 193. Technology and National Security
POLISCI 116. History of Nuclear Weapons
POLISCI 140C. The Comparative Political Economy of Post-Communist Transitions
POLISCI 240T. American Efforts at Promoting Democracy Abroad: Theory and Reality
REES 130. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries
SLAVGEN 13N. Russia and the Russian Experience
SLAVGEN 77Q. Russia's Weird Classic: Nikolai Gogol
SLAVGEN 145. Age of Experiment: From Pushkin to Gogol
SLAVGEN 151. Dostoevsky and His Times (Same as COMPLIT 119.)
SLAVGEN 153. Russian Jewish Literature
SLAVGEN 156. Nabokov in the Transnational Context (Same as COMPLIT 115.)
SLAVGEN 195. Russian Theater
SLAVLIT 187. Russian Poetry of the 18th and 19th Centuries
SOC 15N. The Transformation of Socialist Societies

Other courses may be counted towards the minor by special arrangement with the instructor and the CREEES academic coordinator.

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 in the M.A. program have priority in the annual FLAS competition; in recent years CREEES has also awarded FLAS fellowships in the Graduate School of Business, the School of Medicine, and the School of Law. Consult the CREEES academic coordinator for further information about the application and award process. Applications for FLAS fellowships can be obtained at http://CREEES.stanford.edu/grants/index.html.

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.

MASTER OF ARTS IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

CREEES offers a one-year intensive 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 former Soviet Union and Eastern Europe. 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 academic coordinator 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 are encouraged to apply electronically; see http://gradadmissions.stanford.edu for a link to the electronic application and general information regarding graduate admission. In addition, prospective applicants are strongly encouraged to consult with the academic coordinator at CREEES 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 or the former Soviet Union 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 on a topic in Russian, East European, or Eurasian studies.

The deadline for submission of applications for admission and for financial aid is January 6, 2009. 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 academic coordinator, 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, eight to ten 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 the former Soviet Union or Eastern Europe. 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 academic coordinator, who ensures that planned course work satisfies requirements towards the degree. The CREEES director and steering committee determine the requirements.

Core Courses for 2008-09—
HISTORY 221B. The Woman Question in Modern Russia
HISTORY 323. Art and Ideas in Imperial Russia
HISTORY 321C. Historiography of the Soviet Union
HISTORY 322. Topics in Early Modern Russian History
INTNLREL 166. Russian and Islam
POLISCI 140C. The Comparative Political Economy of Post-Communist Transitions
POLISCI 314D. Democracy, Development, and the Rule of Law (Same as IPS 230.)
REES 205. Central and East European Politics
REES 320. State and Nation Building in Central Asia
SLAVGEN 255. Anton Chekhov and the Turn of the Century
SLAVGEN 290.Tolstoy's *Anna Karenina* in Dialogue with Contemporary Philosophical, Social, and Ethical Thought

Additional 2008-09 courses which may be counted for the M.A. degree—
ANTHRO 147A. Folklore, Mythology, and Islam in Central Asia
ANTHRO 248A. Nomads of Eurasia: Culture in Transition
ARTHIST 245. Photographic Utopia Under Stalin
FILMSTUD 334A. Poetic Cinema: The Soviet School
HISTORY 337. The Holocaust
HISTORY 324B. Modern Afghanistan
HISTORY 329. Poles and Jews
HISTORY 399A. Design and Methodology for International Field Research
HISTORY 323B. Research Methodologies in Early Modern Russian History
HISTORY 324F. The Caucasus and the Muslim World
HISTORY 421A. Early Modern Russia
HISTORY 424C. The End of Communism in Europe
IPS 241. International Security in a Changing World (Same as POLISCI 114S.)
IPS 243. The History, Science, Technology, and Politics of Missile Defense
MS&E 293. Technology and National Security
POLISCI 240T. American Efforts at Promoting Democracy Abroad: Theory and Reality
REES 320. State and Nation Building in Central Asia
REES 330. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries
SLAVGEN 245. Age of Experiment: From Pushkin to Gogol
SLAVGEN 246. History and Other Theories of Time and Action in the Great Russian Novel
SLAVGEN 247. The Age of War and Evolution: A Survey of Russian Literature and Culture, 1900-1950s
SLAVGEN 251. Dostoevsky and His Times (Same as COMPLIT 219.)
SLAVGEN 253. Russian Jewish Literature
SLAVGEN 256. Nabokov in the Transnational Context (Same as COMPLIT 215.)
SLAVGEN 295. Russian Theater
SLAVLIT 287. Russian Poetry of the 18th and 19th Centuries
SLAVLIT 200A. Introduction to Russian Literary Scholarship
SLAVLIT 211. Introduction to Old Church Slavic
SLAVLIT 227. Boris Pasternak and the Poetry of the Russian Avant Garde

Other courses may be counted towards the M.A. by special arrangement with the instructor and the CREEES academic coordinator.

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 IN RUSSIAN, EAST EUROPEAN AND EURASIAN STUDIES

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. Applications and instructions may be obtained at http://registrar.stanford.edu/shared/publications.htm#Coterm.
   The deadline for all coterminal applications to the M.A. program in Russian, East European, and Eurasian Studies is January 6, 2009.

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 academic coordinator 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; and (d) a writing sample. 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.
3. 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. Requirements for completion of the M.A. degree are summarized below; a more detailed description of the program and requirements is available from the center.

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, on leave), Hank Greely (Law), Ursula K. Heise (English), Brad Osgood (Electrical Engineering), Eric Roberts (Computer Science), Selma Sabanovic (Science, Technology, and Society), Rebecca Slayton (Science, Technology, and Society), Fred Turner (Communication), John Willinsky (Education)
Lecturers: Henry Lowood, Selma Sabanovic, Rebecca Slayton
Affiliated Faculty and Staff: Stephen Barley (Management Science and Engineering, on leave), Barton Bernstein (History), Scott Bukatman (Art and Art History), Thomas Byers (Management Science and Engineering), Jean-Pierre Dupuy (French), Paula Findlen (History), Hank Greely (Law), Ursula K. Heise (English), Sarah Jain (Anthropology), Brad Osgood (Electrical Engineering), Robert Proctor (History), Jessica Riskin (History), Eric Roberts (Computer Science), Scott Sagan (Political Science), Londa Schiebinger (History), 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 have the subject code STS, and are listed in the "Science, Technology, and Society (STS) Courses" section of this bulletin.

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. These circumstances require education befitting the complex sociotechnical character of the contemporary era.

Science, Technology, and Society (STS) is an interdisciplinary program devoted to understanding the natures, consequences, and shaping of technological and scientific activities in modern and contemporary societies. Achieving this understanding requires critical analysis of the interplay of science and technology with human values and world views, political and economic forces, and cultural and environmental factors. Hence, 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 (see below)
5. To satisfy requirements for majors in STS (see below)
6. To satisfy requirements for a minor in STS (see below)

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 PROGRAMS IN SCIENCE, TECHNOLOGY, AND SOCIETY

Degree programs in STS are interdisciplinary 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 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 science and technology in society.

BACHELOR OF ARTS IN SCIENCE, TECHNOLOGY, AND SOCIETY

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 Perspectives: STS 110, 112, 114; PHIL 61
      1. Historical Perspectives: STS 120, 128, 134, 141; CLASSGEN 133; ECON 116; HISTORY 140A, 208A, 232H; POLISCI 116
      2. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; MS&E 181, 184, 185, 193; POLISCI 114S, 116
   c. Advanced courses (one course in each category):
      1. Disciplinary Analysis: STS 210, 211, 221, 234; CS 181; COMM 268; ECON 224, 226; EDUC 358X; HISTORY 232G, 243G, 244C; ME 314; MS&E 281
      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 one 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 thematic concentrations have been pre-certified as declarable fields of study on Axess: The Intersections of Technology and Science with Aesthetics; Development; History and Philosophy; Information and Society; Public Policy; Social Change; and Work and Organizations. These fields of study appear on the transcript but not on the diploma.

Course lists for these thematic concentrations 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 and meet the student's special interests.

Alternatively, the student may choose to design a thematic concentration topic and course package subject to program approval. 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 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 the junior year and finishing by May of the senior year. Students who want their projects to be considered for University awards must complete their theses by early May. STS projects entail writing an original honors thesis, although occasionally students have also chosen to produce a technical artifact or carry out some other work that itself represents original thinking. When a project results in a work other than an essay, students 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 grant should enroll in STS 190, Junior Honors Seminar, during the Winter Quarter of the junior year in order to submit a research proposal by the University deadline in early April. Each applicant must submit a research proposal to the STS 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 of 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 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 Perspectives*—
   PHIL 61. Science, Religion, and the Birth of Modern Philosophy
2. *Disciplinary Analysis: Historical Perspectives*—
   ECON 116. American Economic History
   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
   ENGR 145. Technology Entrepreneurship
   MS&E 181. Issues in Technology and Work for a Postindustrial Economy
   MS&E 184. Technology and Work
   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
4. *Disciplinary Analysis, Level II Courses*—
   CS 181. Computers, Ethics, and Public Policy
   COMM 268. Experimental Research in Advanced User Interfaces
   ECON 224. Science, Technology, and Economic Growth
   ECON 226. U.S. Economic History
   EDUC 358X. Developments in Access to Knowledge and Scholarly Communication
   HISTORY 232G. When Worlds Collide: The Trial of Galileo
   HISTORY 243G.Tobacco and Health in World History
   HISTORY 244C. The History of the Body in Science, Medicine, and Culture
   ME 314. Good Products, Bad Products

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 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 paper 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; PHIL 61
   b. Historical Perspectives: STS 120, 128, 134, 141, 144; CLASSGEN 133; ECON 116; HISTORY 140A, 208A, 232H; POLISCI 116
   c. Social Science Perspectives: ANTHRO 82, 180; COMM 120, 169; ENGR 145; MS&E 181, 184, 185, 193; POLISCI 114S, 116; PUBLPOL 194
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 Perspectives: STS 210, 211; CS 181; ME 314
   b. Historical Perspectives: STS 221, 234; ECON 224, 226; HISTORY 232G, 243G, 244C
   c. Social Science Perspectives: COMM 268; ECON 224, 226; EDUC 358X; MS&E 281
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.

SLAVIC LANGUAGES AND LITERATURES

Emeriti: (Professors) Joseph Frank,* Richard D. Schupbach, Joseph A. Van Campen
Chair: Gregory Freidin
Director of Graduate Studies: Lazar Fleishman
Director of Undergraduate Studies: Gabriella Safran
Professors: Lazar Fleishman, Gregory Freidin
Associate Professors: Monika Greenleaf, Gabriella Safran
Senior Lecturer: Rima Greenhill
Lecturer: Eugenia Khassina
Visiting Professor: Alan Timberlake, William Bonsall Visiting Professor in the Humanities

* Recalled to active duty.

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 have the subject codes SLAVGEN, SLAVLANG, and SLAVLIT. Courses in Slavic General are listed in the "Slavic General (SLAVGEN) Courses" section of this bulletin. Courses in Slavic Language are listed in the "Slavic Language (SLAVLANG) Courses" section of this bulletin. Courses in Slavic Literature are listed in the "Slavic Literature (SLAVLIT) Courses" section of this bulletin.

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 history, Jewish Studies, Film Studies (Russian and East-European film), modern Russian theater, International Relations, Stanford's Overseas Studies, the Special Languages Program, and the Honors Program in Interdisciplinary Studies in Humanities.

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 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 history, 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.

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 US.

Improving cultural understanding is a critical part of the department's mission, and we offer a full range of courses at all levels, from Freshman and Sophomore Seminars devoted to Russian literature, music and visual arts that do not require specialized knowledge to 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. Our 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 tremendous faculty resources that are without peer in the US. Green Library and the Hoover Institution libraries and archives possess the premiere Russian and East European collections, which our undergraduates and graduate students use in their research. Our 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.

UNDERGRADUATE PROGRAMS IN SLAVIC LANGUAGES AND LITERATURES

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 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 51, 52, 53, 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 Literature—The 20-unit core literature sequence consisting of:
SLAVGEN 145. Age of Experiment: Pushkin, Lermontov, Gogol
SLAVGEN 146. The Great Russian Novel
SLAVGEN 147. The Age of Revolution
SLAVGEN 148. The Age of Dissent
SLAVLIT 187 or 188

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 2008-09 include:
   SLAVLIT 211. Introduction to Old Church Slavic
   LINGUIST 173/273. Structure of Russian
2. Russian literature; courses for 2008-09 include:
   SLAVGEN 77Q. Russia's Weird Classic: Nikolai Gogol
   SLAVGEN 195/295. Contemporary Russian Theater
   SLAVGEN 151/251. Dostoevsky and His Time
   SLAVGEN 153/253. Russian Jewish Literature
   SLAVGEN 155/255. Anton Chekhov and the Turn of the Century
   SLAVGEN 156/256. Nabokov and Modernism
   SLAVLIT 190/290. Tolstoy's *Anna Karenina* and Social Thought of Its Time
   SLAVLIT 227. Boris Pasternak and the Poetry of the Russian Avant-Garde
   SLAVLIT 289B. Literature and Culture of Kievan Rus and Muscovy
3. Historically related literatures

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 51, 52, 53, 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.

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
HISTORY 120B or equivalent

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
HISTORY 120C or equivalent

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 2008-09 include:
   SLAVLIT 211. Introduction to Old Church Slavic
   LINGUIST 173/273. Structure of Russian
2. Russian literature; courses for 2008-09 include:
   SLAVGEN 77Q. Russia's Weird Classic: Nikolai Gogol
   SLAVGEN 151/251. Dostoevsky and His Time
   SLAVGEN 153/253. Russian Jewish Literature
   SLAVGEN 155/255. Anton Chekhov and the Turn of the Century
   SLAVGEN 156/256. Nabokov and Modernism
   SLAVGEN 195/295. Contemporary Russian Theater
   SLAVLIT 190/290. Tolstoy's *Anna Karenina* and Social Thought of Its Time
   SLAVLIT 227. Boris Pasternak and the Poetry of the Russian Avant-Garde
   SLAVLIT 289B. Literature and Culture of Kievan Rus and Muscovy
3. Russian history

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 248A. Nomads of Eurasia
ARTHIST 245. Photo Utopias under Stalin
ARTHIST 248. Futurisms
ARTHIST 409. Iconoclasm
ARTHIST 475. Media Cultures of the Cold War
HISTORY 221B. Woman Question in Modern Russia
HISTORY 223. Art and Ideas in Imperial Russia
HISTORY 321C. Soviet Historiography
HISTORY 424C. End of Communism in Europe
INTNLREL 166. Russia and Islam
LINGUIST 173/273. Structure of Russian
POLISCI 140C. Post-Communist Transitions
REES 130/330. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries

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 51, 52, 53, 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

DIGITAL HUMANITIES MODULE

The Slavic department also offers a digital humanities module that can be combined with any of the department's major programs. Students who are interested in digital humanities should contact the department's Director of Undergraduate Studies. Students planning to combine the Russian major and the digital humanities module must fulfill the following requirements in addition to the general Russian major requirements:

1. CS 105 or equivalent
2. Participate in the gateway core seminar, HUMNTIES 198J/ENGLISH 153H, Digital Humanities: Literature and Technology (5 units)
3. Complete the HUMNTIES 201, Digital Humanities Practicum (2-5 units), in the junior year
4. Complete one digital project, in lieu of the course's main writing requirement, in a course offered in the department under the supervision of the course instructor and humanities lab adviser. This should usually be done in an upper-division course.
5. Students are encouraged to enroll in DLCL 99, Multimedia Course Lab, when working on the digital course project.

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 courses taken there may be applied toward the major. Courses approved for the Slavic Languages and Literatures major and taught overseas can be found in the "Overseas Studies" section of this bulletin, or in the Overseas Studies office, 126 Sweet Hall.

MINORS IN SLAVIC LANGUAGES AND LITERATURES

The Department of Slavic Languages and Literatures offers three 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, whether through (1) Russian language courses, or (2) a combination of minimal proficiency in Russian and courses in the history of Russian culture, or (3) 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 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, 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 selected from the following Slavic Languages and Literatures courses: 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, Russian Poetry (prerequisite: second-year Russian); 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 culture.

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 is selected from HISTORY 120B, 120C or equivalent. 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

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.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

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.

GRADUATE PROGRAMS IN SLAVIC LANGUAGES AND LITERATURES

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:

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.
   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 graduate adviser and the Department of Comparative Literature or the Department of German Studies, *or*
      2. a sequence of three courses in another department, selected in consultation with the adviser.
   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 chair of Slavic Languages and Literatures, and the chair of the minor department.
   c. Students may fulfill the department's "minor or related field" requirement by enrolling in the Graduate Program in the Humanities (see "Interdisciplinary Program in Humanities" in this bulletin).
2. *Admission to Candidacy:* candidates should read carefully the general regulations governing the degree, as described in the "Graduate Degrees" section of this bulletin. No student is accepted as a candidate until the equivalent of the M.A. degree requirements, including the M.A. thesis described above, is completed. Admission to candidacy is determined early in the sixth quarter of graduate studies. The candidate by that time must have demonstrated commitment to graduate studies by completion of a minimum of 60 quarter units of credit with a grade point average (GPA) of 3.3 (B+) or better, and submission of a complete draft of an M.A. thesis approved by the adviser and the second reader. Failure to do so results in termination of enrollment for the Ph.D. The terminated student may, at the discretion of the faculty, be given the opportunity to take the M.A. written examinations. If successful, the student is then awarded the M.A. degree.
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:* before qualifying for the department oral and written examinations, a Ph.D. candidate is expected to accumulate at least 72 quarter units of credit for courses taken while in graduate school. No less than half of this course work (36 units) must be done in the Department of Slavic Languages and Literatures, including at least 24 units of credit for seminar-level courses. 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 class.
6. *Examinations:* a candidate must pass the departmental general qualifying examinations, which has written and oral parts. The written part covers the history of Russian literature from the medieval period through the twentieth century. The departmental oral qualifying examination follows shortly after completion of the comprehensive exams. The oral examination committee should include a faculty member representing the student's "minor or related field." The student makes a 20-minute presentation of a scholarly paper, possibly the master's thesis. Each examiner questions the student on the presentation and related topics. Following the departmental examinations, a candidate must pass a University oral examination, which is a defense of a dissertation prospectus covering content relevant to the area of study, rationale for the proposed investigation, and strategy to be employed in the research.

Continuation—Continuation in the Ph.D. program is contingent on: for first-year students, a high quality of performance in course work (decided by department evaluation); for second-year students, an M.A. thesis, which should be completed no later than the end of the second quarter of the second year.

Course Work, Breadth Requirements, and Overall Scheduling—

1. Candidates for the Ph.D. degree are allowed as much freedom as possible in the selection of course work to suit their individual program of study. However, candidates 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

   The department's general qualifying examinations must be taken by the end of 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 general qualifying examinations, the student should be concerned primarily with preparation for the departmental and the University oral examinations, which should take place no later than the end of the third quarter of the third year. The fourth and fifth years should be devoted to research 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, including three quarters of first-year Russian and one quarter of literature as a teaching assistant to 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- or second-year courses in non-Slavic 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 of Slavic Languages and Literatures participates in the Graduate Program in Humanities leading to the Ph.D. degree in Slavic Languages and Literatures and Humanities. For a description of that program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

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, Morris Zelditch Jr.
Chair: Karen Cook
Professors: Karen Cook, Paula England, Mark Granovetter, David Grusky, Michael T. Hannan, Douglas McAdam, Susan Olzak, Cecilia Ridgeway, Gi-Wook Shin, C. Matthew Snipp, Nancy B. Tuma, Andrew Walder, Xueguang Zhou
Associate Professors: Shelley Correll, Michael Rosenfeld
Assistant Professors: Henning Hillmann, Tomás Jiménez, Monica McDermott, Paolo Parigi, Rebecca L. Sandefur
Associate Professor (Teaching): Donald Barr
Courtesy Professors: Anthony Bryk, 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
Courtesy Assistant Professor: Christine Min Wotipka
Lecturers: Colin Beck, Christopher Wimer
Consulting Professor: Ruth Cronkite
Consulting Associate Professors: Patricia Chang, Annemette Sorensen
Tinker Visiting Professor: Sonia Rocha
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 have the subject code SOC, and are listed in the "Sociology (SOC) Courses" section of this bulletin.

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 fields of study to assist students in tailoring their education and research to their academic interests and career goals.

FIELDS OF STUDY

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 performance 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 lifestyles. 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.

UNDERGRADUATE PROGRAMS IN SOCIOLOGY

The department offers two options leading to the B.A. degree: the general Sociology major and the Sociology major with a field of study. The general major consists of a core curriculum plus elective courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The major with a field of study consists of a core curriculum plus a concentrated set of courses in one specialized area of sociology.

To graduate with a B.A. in Sociology, students must complete a minimum of 65 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 45 units of core and foundation course work as detailed below.

CORE COURSES REQUIRED FOR THE MAJOR

The following core courses (30 units) are required of majors. It is recommended that students complete SOC 181B, SOC 180A, and SOC 180B in this order.

1. SOC 1. Introduction to Sociology. Students should take this course early in their program.
2. SOC 170. Classics of Modern Social Theory.
3. SOC 181B. Sociological Methods: Statistics, or another introductory statistics course such as STATS 60, PSYCH 10, or equivalent.
4. SOC 180A. Foundations of Social Research
5. SOC 180B. Evaluation of Evidence
6. 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 field of study. For detailed information about Sociology concentration areas, see section on Fields of study (above). Foundation courses, classified by field of study, are as follows:

1. Organizations, Business, and the Economy: SOC 114 or 160
2. Social Movements, Comparative Politics, and Social Change: SOC 110 or 118 or 130
3. Social Psychology and Interpersonal Processes: SOC 120 or 121
4. Social Inequality: SOC 140 or SOC 149

GENERAL SOCIOLOGY MAJOR

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.

In addition to the 45 units required in core and foundation course work, students pursuing the general 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 declaring a field of study.

SOCIOLOGY MAJOR WITH FIELD OF STUDY

The Sociology major with a field of study allows students to pursue a more focused program in one of four fields of study. To complete the requirements for the B.A. degree in Sociology with a field of study, a student must complete all core and foundation course work requirements for the major plus 20 units of course work in the chosen field of study. At least one foundation course must be in the declared field of study and students are encouraged to take as many foundation courses within their field of study as possible. Sociology courses are listed by field of study on the department's web site. Fields of study are declared on Axess; students must also submit a Field of Study Declaration form to the Sociology student services office by the end of the first quarter of the senior year. Interested students should contact the Sociology student services office for additional information or to request a concentration declaration form. Fields of study are noted on the transcript; they do not appear on the diploma.

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.

BACHELOR OF ARTS IN SOCIOLOGY

The department offers two options leading to the B.A. degree: the general Sociology major and the Sociology major with a field of study. The general major consists of a core curriculum plus elective courses intended to provide breadth of exposure to the variety of areas encompassed by sociology. The major with a field of study consists of a core curriculum plus a concentrated set of courses in one specialized area of sociology.

To graduate with a B.A. in Sociology, students must complete a minimum of 65 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 45 units of core and foundation course work as detailed below.

CORE COURSES REQUIRED FOR THE MAJOR

The following core courses (30 units) are required of majors. It is recommended that students complete SOC 181B, SOC 180A, and SOC 180B in this order.

1. SOC 1. Introduction to Sociology. Students should take this course early in their program.
2. SOC 170. Classics of Modern Social Theory.
3. SOC 181B. Sociological Methods: Statistics, or another introductory statistics course such as STATS 60, PSYCH 10, or equivalent.
4. SOC 180A. Foundations of Social Research
5. SOC 180B. Evaluation of Evidence
6. 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 field of study. For detailed information about Sociology concentration areas, see section on Fields of study (above). Foundation courses, classified by field of study, are as follows:

1. Organizations, Business, and the Economy: SOC 114 or 160
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GENERAL SOCIOLOGY MAJOR

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with their assigned faculty adviser promptly after declaring the major.

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SOCIOLOGY MAJOR WITH FIELD OF STUDY

The Sociology major with a field of study allows students to pursue a more focused program in one of four fields of study. To complete the requirements for the B.A. degree in Sociology with a field of study, a student must complete all core and foundation course work requirements for the major plus 20 units of course work in the chosen field of study. At least one foundation course must be in the declared field of study and students are encouraged to take as many foundation courses within their field of study as possible. Sociology courses are listed by field of study on the department's web site. Fields of study are declared on Axess; students must also submit a Field of Study Declaration form to the Sociology student services office by the end of the first quarter of the senior year. Interested students should contact the Sociology student services office for additional information or to request a concentration declaration form. Fields of study are noted on the transcript; they do not appear on the diploma.

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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 fields of study. Students who wish to declare a minor in Sociology must do so no later than the deadline for their application to graduate.

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

GRADUATE PROGRAMS IN SOCIOLOGY

The Department of Sociology offers three types of advanced degrees: The Doctor of Philosophy; the Coterminal Master's Degree which is restricted to currently enrolled Stanford undergraduates; and the Master of Arts in Sociology which is available to Stanford students who are currently enrolled in other advanced degree programs.

MASTER OF ARTS IN SOCIOLOGY

The Department of Sociology offers an M.A. degree only to students concurrently enrolled at Stanford. General University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin. The department does not have a terminal M.A. program for external applicants.

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. Typically, undergraduates apply to the program at the end of their junior year or beginning of their senior 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. It is recommended that applicants have completed at least one Sociology course at the 100 level with a grade of 'B' or better. GRE test scores are not required. The department accepts applications twice a year: for the 2008-09 academic year, application deadlines are November 14, 2008 and May 15, 2009. Seniors wishing to coterm must apply by November 14, 2008. All application materials are submitted directly to the Sociology graduate student services office. Most applicants choose a field of study to focus their sociological studies; see "Sociology Major with Field of Study" section. To apply for admission to the Sociology coterminal M.A. program, students should submit the coterminal application and the following: (1) a 2-5 page statement of purpose stating the applicant's field of study; (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; and (4) two letters of recommendation from Stanford faculty familiar with the student's academic work. 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. 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 with a field of study must complete 20 units of course work in the field of study, including at least one foundation course from their field of study; see "Core Curriculum for All Majors" section. Sociology courses are listed by field of study here: http://sociology.stanford.edu/programs/areas.html. Students who want 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. Sociology Ph.D.s typically receive their M.A. in their second or third year of graduate study. 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 and must be taken for a letter grade if possible. Workshop, research and directed reading courses are acceptable, but are limited to 15 units and must be approved by the Student Services Officer in advance. Interested students should contact the Sociology student services office for additional information and approval of programs. University regulations pertaining to the M.A. are listed in the "Graduate Degrees" section of this bulletin. Students are not expected to choose a field of study, but may do so if desired. No thesis is required. While formal application to the M.A. program is not required, applicants from outside of the Sociology department must submit: (1) a completed Graduate Authorization Petition form (available from the Office of the University Registrar); (2) a completed Program Proposal for an M.A. form (available from the Office of the University Registrar); and (3) a short statement of purpose to the Sociology student services office.

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 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.

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 the department and faculty. One unit of credit is given for this course; grading is on a satisfactory/no credit basis.
2. Students 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 work as a research assistant (RA), or unpaid work as a research apprentice. With prior approval, this requirement may be met through work on research projects conducted outside the department or University. 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.
3. 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.
4. 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 undertakes to ensure that an adequate selection of such courses is offered. A list of courses that fulfill this requirement is listed in the requirements section below. Students should consult with their adviser to ensure that the combination of courses chosen 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.
5. Students must take one course in classical sociological theory (SOC 370A or B, or equivalent), and one course on the development of theory and research design (SOC 372 or equivalent). It is recommended that students complete SOC 370A and B, although only one of these courses is formally required.
6. Students must complete the series of required research methods courses listed in the requirements section below. Students with little background in statistics are encouraged to take SOC 281B or equivalent.
7. Beginning in year two, doctoral students are required to enroll in at least one workshop each quarter. Due to unit constraints, students may petition the Sociology student services office to attend a workshop without enrolling; such attendance is not noted on the transcript.
8. Students must complete a paper in the second year of residency on any sociological topic; it may address theoretical, empirical, or methodological issues. The paper is expected to reflect original work and is considered an important piece of evidence in the decision to advance to candidacy. A two-person committee that includes the primary adviser evaluates the paper. Although the reading committee is usually comprised of two regular faculty members in the department, emeritus and affiliated faculty may also serve as readers. The two readers of the second-year paper committee provide a review that speaks to: (1) whether the paper is publishable; and (2) what types of revisions, insofar as the paper is publishable, the student should pursue to ready the paper for publication. These comments are shared with the Director of Graduate Studies. Additionally, the committee meets with the student in June of the second year to discuss these reviews. 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 1. The final deadline for paper submission is May 15. This deadline applies to students who entered the department in 2006-07 and later.
9. Students are required to present at least two papers at a major professional meeting in their first five years of graduate study.
10. Students must prepare a dissertation prospectus and pass the University oral examination. The oral exam is intended to evaluate the dissertation prospectus or a partial draft of the dissertation and to assess the student's knowledge of the theory and research in the area in which the project intends to contribute. This requirement must be completed by December 1 of the fourth year of residency.
11. Each student must complete a doctoral dissertation. At the choice of the student, and in consultation with the adviser, the dissertation requirement may be met either by submitting the standard book-style document or by submitting three independent papers. The latter papers may address the same topic, but should be written as stand-alone, single-authored papers in standard journal format. None of these papers may overlap substantially with the second-year paper or with one another. The main criterion in judging substantial overlap is whether any standard journal, such as *The American Journal of*

Sociology, 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 filing deadline. Assessment of satisfactory completion is determined by the student's doctoral committee members. Students are invited to present their dissertation findings at an informal department colloquium.

The faculty is 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, the faculty again review the progress of all doctoral students in the program. Students who are performing well, as indicated by their course work, teaching and research apprenticeship performance, and second-year paper, 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 still on probation at this stage may be (1) advanced to candidacy; (2) retained on probation with specification of the steps still required to be removed from this status; or (3) terminated from the program.

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:

308. Social Demography
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
340. Social Stratification
342B. Gender and Social Structure
345. Comparative Race and Ethnic Relations
360. Foundations of Organizational Sociology
363A. Seminar on Organizational Theory

RESEARCH METHODS

The following course requirements apply to students who entered the Ph.D program in 2005-06 or later. 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; this course is offered in alternate years.

281B. Statistics (not required but recommended for students with little statistical background)
381. Sociological Methodology I: Introduction
382. Sociological Methodology II: The General Linear Model
383. Sociological Methodology III: Advanced 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

Students must complete additional course work sufficient to prepare them to write their second-year paper.

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 with the following 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. Research and directed reading courses are acceptable, but are limited to 15 units and must be approved in advance. 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, available from the Office of the University Registrar) 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 54 semester (81 quarter) hours of approved courses may be counted toward both degrees, but no more than 24 semester (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 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.

SPANISH AND PORTUGUESE

Emeriti: (Professors) Bernard Gicovate, Mary Pratt, Isabel Magaña Schevill, Sylvia Wynter; *(Professor, Teaching)* María-Paz Haro
Chair: Joan Ramon Resina
Director of Graduate Studies: Vincent Barletta
Director of Undergraduate Studies: Lisa Surwillo
Minors Coordinator: Michael Predmore
Professors: Michael P. Predmore, Joan Ramon Resina, Jorge Ruffinelli, Yvonne Yarbro-Bejarano
Associate Professor: Vincent Barletta
Assistant Professors: Héctor M. Hoyos, Lisa Surwillo
Courtesy Professors: John Felstiner, Roland Greene, Hans U. Gumbrecht, Ramón Saldívar
Courtesy Associate Professors: James A. Fox, Paula Moya
Visiting Professors: Jordi Balló, Juan José Sánchez
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 214
Mail Code: 94305-2014
Phone: (650) 723-4977
Email: span-port@stanford.edu
Web Site: http://span-port.stanford.edu

Courses offered by the Department of Spanish and Portuguese have the subject codes SPANLIT and PORTLIT. Courses in Spanish LIterature are listed in the "Spanish Literature (SPANLIT) Courses" section of this bulletin. Courses in Portuguese Literature are listed in the "Portuguese Literature (PORTLIT) Courses" section of this bulletin. 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 Spanish and Portuguese offers courses focused on the languages, literatures, and cultures of the Iberian Peninsula, Latin America, and Latina/o populations in the United States. The department balances an emphasis on literary studies with a more diverse, humanistic set of approaches to cultural and social issues.

The department's faculty is made up of scholars in fields as diverse as contemporary Catalan literature, modern and contemporary Spanish literature and cinema, contemporary Latin American literature and cinema, Aljamiado and medieval Iberian literature, and Chicana/o culture and literature. In general, the department's programs are characterized by an interdisciplinary focus that combines the study of literature with other intellectual and scholarly concerns.

The department nurtures cooperative relationships with other departments and programs at Stanford, thus facilitating intellectual inquiry in areas such as anthropology, philosophy, history, linguistics, Mediterranean studies, medieval and Renaissance studies, European and Latin American politics, bilingualism, 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; and (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 regularly hosts visiting faculty, including the Ginebre Serra visiting chair in Catalan Studies.

Courses are open to all interested students. The department awards B.A., M.A., and Ph.D. degrees in Spanish to eligible candidates.

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.

UNDERGRADUATE PROGRAMS IN SPANISH AND PORTUGUESE

The department offers a bachelor of arts in Spanish and minors in Spanish and Portuguese.

The bachelor of arts in Spanish is designed to acquaint students with the diversity of literary and cultural traditions from the Iberian Peninsula and Spanish- and Portuguese-speaking Latin America. Optional courses permit students to develop a concentration in an area of interest, or to enhance their knowledge of the areas they come to know through the core courses. Students are normally expected to declare the major during the sophomore year, but it is possible to declare during the junior year as well.

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.

BACHELOR OF ARTS IN SPANISH

The major in Spanish requires 56 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 Director 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 Director of Undergraduate Studies who, in consultation with the chair, 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 a Spanish major should see the Director of Undergraduate Studies.

Double Majors—The major in Spanish and Portuguese 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. Two Writing in the Major (WIM) courses are required and these are prerequisites for every subsequent course in the major; concurrent enrollment is allowed.

a. SPANLANG 102. Writing and composition (5 units)
b. SPANLIT 120. Introduction to Literary and Scholarly Research (3 units)

2. Core courses in literature. Students are required to take:
   a. SPANLIT 157. Introduction to Medieval and Early Modern Iberian Literatures
   b. SPANLIT 136. Introduction to Modern Iberian Literatures
   c. SPANLIT 161. Introduction to Modern Latin American Literature
3. Core course in culture, history, and civilization. Choose at least one:
   a. SPANLIT 130. Cultural Perspectives in Iberia
   b. SPANLIT 131. Cultural Perspectives in Latin America
4. A senior seminar, SPANLIT 278 or 278A. Topics vary. Two options are offered per year.
5. Up to two courses of introductory language classes may be applied towards the major, such as CATLANG 1A and 2A or PORTLANG 1A and 2A. This is recommended but not required.
6. Any additional 100- or 200-level Spanish or Portuguese literature courses (SPANLIT or PORTLIT) above 100 to complete the required 56 units. One course above 100 and one core course, or consent of the instructor, are prerequisites for 200-level courses. When choosing courses, students are encouraged to consult the Director 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

Spanish and Portuguese majors with a grade point average (GPA) of 3.3 (B+) 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 SPANLIT 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 SPANLIT 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 a 189B course in the junior year may enroll in SPANLIT 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 develop advanced linguistic competence in Spanish or Portuguese, or who wish 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 may count towards the minor, with the approval of the minors coordinator, and up to 10 units of relevant course work taken abroad, may count toward these minors. Courses other than those listed as eligible may only count toward the minor with the approval of the minors coordinator or the Director of Undergraduate Studies. To declare either of these minors or for more information, see the minors coordinator or the undergraduate student services office in the Division of Literatures, Cultures, and Languages.

MINOR IN SPANISH

Requirements—

1. SPANLANG 102. Writing and composition
2. A 100- or 200-level course in Iberian literature
3. A 100- or 200-level course in Latin American literature
4. Any additional 100- or 200-level courses in literature and culture to complete 30 units. IHUM courses taught at least partially by a faculty member of the department count towards these electives.

MINOR IN PORTUGUESE

Requirements—

1. PORTLANG 102.
2. A 100- or 200-level course in Iberian literature with a Lusophone component
3. A 100- or 200-level course in Latin American literature with a Lusophone component
4. Any additional 100- or 200-level courses in literature and culture to complete 30 units. IHUM courses taught at least partially by a faculty member of the department, and with a Lusophone component, count towards 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 SPANISH AND PORTUGUESE

All majors are encouraged to study abroad. To transfer credits from non-Stanford programs abroad, consult the Office of the University Registrar. Depending on course selections, up to 20 units of course work taken abroad may be applied toward the major 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 Director of Undergraduate Studies, the minors coordinator, or an undergraduate adviser 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, although the department does not sponsor any one in particular. Students considering different options are encouraged to speak with the Chair of the department or the Director of Undergraduate Studies.

STANFORD IN SANTIAGO, CHILE AND MADRID, 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 and course offerings are listed in the "Overseas Studies" section of this bulletin or at http://osp.stanford.edu. Internships and research opportunities may be arranged for two quarter students.

SPAIN

The Department of Spanish and Portuguese recommends study in Spain with the Barcelona Consortium administered by Brown University. This program combines courses at the program's center with open access to courses at three Barcelona universities: Universitat Pompeu Fabra, University of Barcelona, and Autonomous University of Barcelona. Visiting faculty from Brown, Chicago, and Northwestern complement the offerings of these three major universities. Admission is competitive, presupposing competence in Spanish at the time of application. An introductory, three-week program in Mediterranean culture and Barcelona history prior to the beginning of the semester familiarizes students with the history and culture of the area.

Other programs are also recognized by the department, and students are encouraged to discuss their interests with the Chair or with the Director 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 Lyris Wiedemann. Students interested in study in Portugal should contact Professor Vincent Barletta.

GRADUATE PROGRAMS IN SPANISH

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. For University coterminal degree program rules and application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

STEP COTERMINAL TEACHING PROGRAM

The Department of Spanish and Portuguese, in cooperation with the Stanford Teacher Education Program (STEP) of the School of Education, offers a special course of study for students interested in becoming teachers. By following this course of study in Spanish Language, Literatures, and Cultures and enrolling in the STEP Coterminal Teaching Program, students can, after 5 years, receive a B.A. in Spanish and Portuguese, an M.A. in Education, and a California Teaching Credential.

The Spanish Language, Literatures, and Cultures curriculum consists of approximately 56 quarter units in addition to demonstrated proficiency in the language, defined as listening, speaking, reading, and writing at a level equivalent to advanced on the ACTFL Oral Proficiency Interview. This course of study fulfills all the major requirements of the Department of Spanish and Portuguese and includes course work in linguistics and language diversity studies, the history of the Spanish-speaking world, and Spanish literature and cultures.

Students enrolled in the STEP Coterminal Teaching Program are also expected to complete a series of core courses during their undergraduate years. These include one course in developmental psychology; one course in cognitive psychology; one course in the social foundations of education; one course on the role of race, class, and ethnicity in American society; a structured internship experience in a community-based organization serving youth and/or their families; and a teaching practicum offered by the School of Education.

For more information about this option, call (650) 723-2110.

MASTER OF ARTS IN SPANISH

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 have a grade point average (GPA) of 3.0 or above.

The requirements for the M.A. are:

1. One course in literary or cultural theory
2. Two 200 or above courses in Latin American (including Brazilian) or Latino/Chicano literature and culture
3. Two 200 or above courses in Iberian Studies
4. One 300-level course in Iberian Studies and one in Latin American (including Brazilian)
5. Reading knowledge of Portuguese or Catalan for students concentrating in Spanish, or Spanish or Catalan for students concentrating in Portuguese.

Independent study courses (SPANLIT 299, 399) and crosslisted courses originating outside the department may not be used to fulfill requirements except by consent of the Director 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 SPANISH

The requirements of the Ph.D. in Spanish are:

1. 135 units of graduate-level course work with a grade point average (GPA) of 3.0 (B) or above. Units completed for the M.A. degree can be counted toward the Ph.D.
2. One course on introduction to literary theory, which may be fulfilled with COMPLIT 369
3. Knowledge of Portuguese and Catalan equivalent to one year of university study
4. The qualifying paper, the comprehensive examination, and the University oral examination, as described below
5. Teaching of three to five courses in the department
6. Completion of a dissertation

Independent study courses (299, 399) and crosslisted courses originating outside the department may not be used to fulfill requirements except by consent of the Director of Graduate Studies in consultation with the student's graduate adviser. 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/Chicano 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, Humanities, 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. Prior to the quarter in which the comprehensive examination is taken, students are required to take at least one graduate seminar in the department every quarter.

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 of approximately 20 pages, called the qualifying paper, by the third week of Winter Quarter of the second year. The requirements for this paper are outlined in 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. At this time, students hand in a long research paper to be evaluated by the faculty. 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 passing the comprehensive examination. The oral examination covers plans for the dissertation based on a prospectus approved by the committee (15 to 20 pages), and may be taken in English, Spanish, Portuguese, or Catalan, depending on the committee's composition.

The dissertation must be submitted to the reading committee 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. 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 continued financial support.

PH.D. IN SPANISH AND HUMANITIES

The Department of Spanish and Portuguese participates in the Graduate Program in Humanities leading to a Ph.D. degree in Spanish and Humanities. For a description of that program, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

PH.D. MINOR IN SPANISH

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 Spanish who choose a minor in another department should consult with advisers in that department.

STATISTICS

Emeriti: Theodore W. Anderson, Ingram Olkin, Charles Stein
Chair: Trevor J. Hastie
Professors: Thomas M. Cover, Amir Dembo, Persi Diaconis, David L. Donoho, Bradley Efron, Jerome H. Friedman, Trevor J. Hastie, Iain M. Johnstone, Tze L. Lai, Art Owen, Joseph P. Romano, David O. Siegmund, Paul Switzer, Robert J. Tibshirani, Wing H. Wong
Associate Professors: Jonathan Taylor, Guenther Walther
Assistant Professors: Andrea Montanari, Nancy Zhang
Professor (Teaching): Susan Holmes
Courtesy Professors: Philip W. Lavori, Richard A. Olshen
C*ourtesy Associate Professors:* Simon Jackman, David Rogosa
Consulting Professors: John Chambers, Charles Chui, David G. Stork

Mail Code: 94305-4065
Phone: (650) 723-2620
Web Site: http://www-stat.stanford.edu

Courses offered by the Department of Statistics have the subject code STATS, and are listed in the "Statistics (STATS) Courses" section of this bulletin.

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, Olshen, Tibshirani, Wong), Mathematics (Dembo, Diaconis), Political Science (Jackman), and the Stanford Linear Accelerator Center (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 our 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.

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). 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. 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

GRADUATE PROGRAMS IN STATISTICS

University requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

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 103, 113, 115, 171; and one of CS 106A, 106X, 137, 138. 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 260ABC, 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. 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, and 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 (beginning of second year); breadth requirement (second or third year); University oral examination (end of third year or beginning of 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 statistical consulting. All students who have passed the qualifying exam 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.

University Oral Examination—The University oral examination is taken on the recommendation of the student's research adviser after the thesis problem has been well defined and some research progress has been made. Usually, this happens early in the student's fourth year. The oral examination consists of a 40-minute presentation on the thesis topic, followed by two question periods. The first question period relates directly to the student's presentation; the second is intended to explore the student's familiarity with broader statistical topics related to the thesis research.

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 strongly encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

PH.D. MINOR IN STATISTICS

The minimum requirement for a Ph.D. minor is 20 units of course work at the 200 level, taken at Stanford. The Department of Statistics devises individual Ph.D. minor programs, but the department recommends that graduate students in other fields who wish to have a subspecialty in statistics study for an M.S. degree instead. The unit requirement for an M.S. degree is 45 units, whereas the number of units required for a minor averages around 30. This difference of 15 units can be made up by the student by including in the M.S. program courses from his or her own field which are related to statistics or applications of statistics. Contact the student services officer for further information.

SYMBOLIC SYSTEMS

Director: Ivan A. Sag
Associate Director: Todd Davies
Program Committee: Lera Boroditsky, Todd Davies, Scott Klemmer, Byron Reeves, Eric Roberts, Ivan A. Sag, Paul Skokowski, Kenneth A. Taylor, Thomas A. Wasow
Program Faculty:
Art and Art History: Scott Bukatman (Associate Professor)
Applied Physics: Bernardo Huberman (Consulting Professor)
Classics: Reviel Netz (Professor)
Communication: Jeremy Bailenson (Assistant Professor), Clifford Nass (Professor), Byron Reeves (Professor), Frederick Turner (Assistant Professor)
Computer Science: David Dill (Professor), Brian Jeffrey Fogg (Consulting Assistant Professor), Michael Genesereth (Associate Professor), Margaret Johnson (Senior Lecturer), 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 (Assistant 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: John R. Koza (Consulting Professor), Krishna Shenoy (Assistant 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 (Assistant Professor), Joan Bresnan (Professor), 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), Ivan A. Sag (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), John R. Koza (Consulting Professor)
Music: Jonathan Berger (Associate Professor), Christopher Chafe (Professor), Eleanor Selfridge-Field (Consulting Professor), William L. Verplank (Lecturer), Ge Wang (Assistant Professor)
Neurobiology: Ben Barres (Professor), William T. Newsome (Professor), Jennifer Raymond (Assistant Professor)
Philosophy: Michael Bratman (Professor), Alexis Burgess (Assistant Professor), Mark Crimmins (Associate Professor), John Etchemendy (Professor), Solomon Feferman (Professor Emeritus), Dagfinn Føllesdal (Professor), David Israel (Consulting Associate Professor), Krista Lawlor (Associate Professor), Grigori Mints (Professor), Marc Pauly (Assistant Professor), Raymond Perrault (Consulting Associate Professor), John Perry (Professor), 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 (Assistant Professor), Herbert H. Clark (Professor), Anne Fernald (Associate Professor), Susan Johnson (Assistant Professor), Brian Knutson (Associate Professor), Ellen Markman (Professor), James McClelland (Professor), Samuel McClure (Assistant Professor), Michael Ramscar (Assistant Professor), Barbara Tversky (Professor Emerita), Anthony Wagner (Associate Professor), Brian Wandell (Professor)
Statistics: Persi Diaconis (Professor), Susan P. Holmes (Professor, Teaching)
Symbolic Systems: William Byrne (Consulting Assistant Professor), Todd Davies (Lecturer), Tracy King (Consulting Associate Professor), Pat Langley (Consulting 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), John Kunz (Senior Research Engineer), Stephan Oepen (CSLI Senior Research Engineer)

Program Offices: Margaret Jacks Hall, Building 460, Room 40A
Mail Code: 94305-2150
Phone: (650) 723-4284
Email: ssp-af@csli.stanford.edu
Web Site: http://symsys.stanford.edu

Courses offered by the Program in Symbolic Systems have the subject code SYMBSYS and are listed in the "Symbolic Systems (SYMBSYS) Courses" section of this bulletin.

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 like 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.

UNDERGRADUATE PROGRAMS IN SYMBOLIC SYSTEMS

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*: SYMBSYS 100. Introduction to Cognitive Science
2. *Computer Programming:*
   a. CS 106A. Programming Methodology *and* 106B. Programming Abstractions; *or* 106X. Programming Methodology and Abstractions (Accelerated); *and*
   b. CS 107. Programming Paradigms
3. *Logic*:
   a. PHIL 150. Basic Concepts in Mathematical Logic; *or* 150X. Basic Concepts in Mathematical Logic, *and* CS 103. Mathematical Foundations of Computing, 103A. Discrete Mathematics for Computer Science, *or* 103X. Discrete Structures (Accelerated)
   b. PHIL 151. First-Order Logic
4. *Computational Theory:*
   a. CS 103B. Discrete Structures; *or* 103X. Discrete Structures (Accelerated) *or* 103. Mathematical Foundations of Computing
   b. CS 154. Introduction to Automata and Complexity Theory; *or* PHIL 152. Computability and Logic
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
   b. PHIL 80. Mind, Matter, and Meaning (WIM)
7. *Cognitive Psychology*: PSYCH 55. Introduction to Cognition and 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. Introduction to Computational Linguistics
   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 SYMBSYS 201 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 SYMBSYS 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://urp.stanford.edu.

HONORS PRORAM

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 SYMBSYS 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 SYMBSYS 91, Junior Honors Seminar. SYMBSYS 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.

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*: SYMBSYS 100* *or* PSYCH 40 *or* 55
   b. *Logic and Computation*: PHIL 150 *or* 151, *or* CS 103B, 103X, *or* 154
   c. *Computer Programming*: CS 106B, 106X, *or* 107
   d. *Philosophical Foundations:* SYMBSYS 100* *or* PHIL 80
   e. *Formal Linguistics*: LINGUIST 120, 130A, *or* 130B
   f. *Artificial Intelligence:* CS 121 *or* 221
2. SYMBSYS 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.

* SYMBSYS 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 Symbolic Systems track for interdisciplinary graduate level work.

For University coterminal degree program rules and University application forms, see http://registrar.stanford.edu/shared/publications.htm#Coterm.

GRADUATE PROGRAM IN SYMBOLIC SYSTEMS

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 SYMBOLIC SYSTEMS

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
   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 280/CS 224N. Natural Language Processing
   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 (SYMBSYS 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 247A), *or* CS 295, Software Engineering; *and* CS 147, Introduction to Human-Computer Interaction Design; *and* CS 247A, Human-Computer Interaction: Interaction Design Studio*; and* CS 376, Research Topics in Human-Computer Interaction.

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 280/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 180. Introduction to Computer Speech and Language Processing, *and*
   b. LINGUIST 283. Programming and Algorithms for Natural Language Processing

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 will 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 B.S. and 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
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 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)
CS 147. Introduction to Human-Computer Interaction Design
CS 154. Introduction to Automata and Complexity Theory
CS 157. Logic and Automated Reasoning
CS 161. Design and Analysis of Algorithms
CS 181. Computers, Ethics, and Public Policy
CS 193D. Professional Software Development with C++
CS 204. Computational Law
CS 205A. Mathematical Methods for Robotics, Vision, and Graphics
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
CS 224S. Speech Recognition and Synthesis
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 376. Research Topics in Human-Computer Interaction
CS 377. Topic in Human-Computer Interaction
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. Online Communities of Learning
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 145. Birds to Words: Cognition, Communication, and Language (Same as PSYCH 137/239A)
LINGUIST 1. Introduction to Linguistics
LINGUIST 63N. 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 133/233. Introduction to Formal Pragmatics
LINGUIST 140/240. Language Acquisition I
LINGUIST 182/282. Human and Machine Translation
LINGUIST 183/283. Programming and Algorithms for Natural Language Processing
LINGUIST 187/287. Grammar Engineering
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 226. Binding
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 285. Finite State Methods in Natural Language Processing
MATH 103. Matrix Theory and Its Applications
MATH 113. Linear Algebra and Matrix Theory
MATH 151. Introduction to Probability Theory
MATH 162. Philosophy of Mathematics (Same as PHIL 162)
ME 115B. Human Values in Design
MS&E 120. Probabilistic Analysis
MS&E 121. Introduction to Stochastic Modeling
MS&E 201. Dynamic Systems
MUSIC 151. Psychophysics and Cognitive Psychology for Musicians
MUSIC 220A. Fundamentals of Computer-Generated Sound
MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing
MUSIC 250A. HCI Theory and Practice
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 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 181. Philosophy of Language
PHIL 184. Theory of Knowledge
PHIL 184B. Philosophy of the Body
PHIL 186. Philosophy of Mind
PHIL 187. Philosophy of Action
PHIL 188. Personal Identity
PHIL 194P. Naming and Necessity
PHIL 194R. Epistemic Paradoxes
PHIL 350A. Model Theory
PHIL 351A. Recursion Theory
PHIL 354. Topics in Logic
PHIL 366. Evolution and Communication
PHIL 387. Practical Rationality
PSYCH 1. Introduction to Psychology
PSYCH 7Q. Language Acquisition

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 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 202. Cognitive Neuroscience
PSYCH 204A. Computational Neuroimaging
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 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), Karen Cook (Sociology), Milbrey McLaughlin (Education), Walter Scheidel (Classics), Jeff Wachtel (President's Office)
Affiliated Faculty: 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), David Grusky (Sociology), Ian Hodder (Anthropology), Miyako Inoue (Anthropology), Sarah Jain (Anthropology), David Labaree (Education), Raymond Levitt (Civil and Environmental Engineering), Carolyn Lougee (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), Karen Seto (Geological and Environmental Sciences), Michael Shanks (Classics), Jennifer Trimble (Classics), Nancy Brandon Tuma (Sociology, Hoover Institution), Paul Turner (Art and Art History), Barbara Voss (Anthropology)
Lecturers: David Boesch, Karin Cotterman, Melanie Edwards, Radford Hall, Michael Kahan, Michael Kieschnick, Joseph Kott, Michael Reilly, Laura Scher, Jackie Schmidt-Posner, Frederic Stout
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Courses offered by the Urban Studies Program have the subject code URBANST, and are listed in the "Urban Studies (URBANST) Courses" section of this bulletin.

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.

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 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.

UNDERGRADUATE PROGRAMS IN URBAN STUDIES

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; the units for these prerequisite 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 201A during Winter Quarter of the junior year. This internship, or an appropriate substitution where necessary, should be arranged no later than Autumn Quarter of the junior year. Urban Studies majors who wish to receive academic credit for additional internship work may enroll once in URBANST 194. 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 core course requirements, 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 summer placement at one of Stanford's overseas locations.

Courses counted toward the 73-unit graduation requirement for the major (except URBANST 201A) must be taken for a letter grade, and a minimum grade of 'C' is required. 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:
EARTHSYS 144. Fundamentals of Geographic Information Systems
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. Students should also consider enrolling in one of the Stanford Overseas Seminars, intensive courses taught in September in locations which do not have overseas campuses.

The following course is required for the cities in comparative and historical perspective concentration:
ANTHRO 112. The Archaeology of Modern Urbanism

The following courses may be counted toward the cities in comparative and historical perspective concentration:
AFRICAST 107. Community Restructuring and Development in South Africa
AMSTUD 184. Cityscapes of the Imaginary: The Urban World in Literature and Film
AMELANG 177. Middle Eastern Cities in Literature and FIlm
ANTHRO 128B. Globalization and Japan
ANTHRO 142. Incas and their Ancestors: Peruvian Archaeology
ANTHRO 144. Ancient Cities in the New World
ANTHRO 145B. Evolution of Civilizations
ANTHRO 146A. The Aztecs and their Ancestors: Introduction to Mesoamerican Archaeology
ANTHRO 151. Anthropology and Demography
ARTHIST 3. Introduction to the History of Architecture
ARTHIST 107A. St. Petersburg: A Cultural Biography
ARTHIST 141. The Invention of Modern Architecture
ARTHIST 212. Renaissance Florence, 1400-1540
ARTHIST 252A. Place: Making Space Now
ARTHIST 283A. Paris and Shanghai, 1880-1940: Mediating the City
ANTHRO 133. City and Sounds
ANTHRO 137E. Excavation at Catalhoyuk, Turkey
ANTHRO 126A. Post-Socialist City
CLASSGEN 36. Projecting Rome
CLASSGEN 60. The Life and Death of a Roman City: Pompeii
CLASSHIS 60. The Romans
CLASSHIS 101. The Greeks
CLASSHIS 105. History and Culture in Ancient Egypt
GES 138. Urbanization, Global Change, and Sustainability
GES 142. Remote Sensing of Land Use and Land Cover
HISTORY 85S. Jews, Christians and Muslims in a Mediterranean Port City: Salonica, 1821-1945
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 232D. Rome: The City and the World
HISTORY 234. Paris and Politics, 1600-2008
HISTORY 252H. Environmental History of the San Francisco Bay Area
HISTORY 260. California's Minority-Majority Cities
HISTORY 276. Modern Brazil
HISTORY 291B. The City in Imperial China
ME 120. History and Philosophy of Design
OSPBER 11. The Vanishing City: Lost Architecture and the Art of Commemoration in Berlin
OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin
OSPBER 13. Jewish and Muslim Berlin
OSPFLOR 36. Introduction to the International Economy: The State, the Firm, and the Region
OSPFLOR 115Y. The Duomo and the Piazza della Signoria: Symbols of a Civilization
OSPKYOTO 28. Kyoto: History of Urban and Architectural Space
OSPMADRD 70. European Urban Development: The Cases of Madrid and Barcelona
OSPOXFRD 65. Oxford: The City as a Work of Art
OSPPARIS 25. Literature and 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
SOC 168. Global Organizations: Managing Diversity
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 212X. Urban Education

The following courses may be counted toward the urban education concentration:
AFRICAST 211. 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 177. Education of Immigrant Students: Psychological Perspectives
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 201A. History of African American Education
EDUC 201B. Education for Liberation
EDUC 202. Introduction to Comparative and International Education
EDUC 204. Introduction to the Philosophy of Education
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
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 88. Theories in Race and Ethnicity
CEE 64. Air Pollution: From Urban Smog to Global Change
CEE 100. Managing Sustainable Building Projects
CEE 131. Architectural Design Process
CEE 142A. Sustainable Development
CEE 171. Environmental Planning Methods
CEE 172. Air Quality Management
EARTHSYS 124. Environmental Justice: Local, National, and International Dimensions
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
GES 138. Urbanization, Global Change and Sustainability
GES 142. Remote Sensing of Land Use and Land Cover Change
HISTORY 105. Gandhi, King and Non-Violence
HISTORY 252H. Environmental History of the San Francisco Bay Area
HISTORY 255. Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice
HISTORY 260. California's Minority-Majority Cities
MS&E 196. Transportation Systems and Urban Development
POLISCI 143. Nongovernmental Organizations and Development in Poor Countries
POLISCI 221F. Race and American Politics
POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
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. Homelessness: Its Causes, Consequences, and Policy Solutions
SOC 140. Introduction to Social Stratification
SOC 141. Controversies About Inequality
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 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 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 162. Managing Local Governments
URBANST 163. Land Use Control
URBANST 165. Sustainable Urban and Regional Transportation Planning
URBANST 171. Urban Design Studio
URBANST 173. Urban Economics

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 middle of the second quarter of the student's junior 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 and 201 or 202 should be taken in the junior year, and URBANST 203 in the senior year.
URBANST 201. Preparation for Senior Project
or URBANST 202. Preparation for Honors Thesis
URBANST 201A. Capstone Internship in Urban Studies
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 the last day of classes in Spring Quarter 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 do not count towards the 73-unit requirement for graduating with a B.A. in Urban Studies. Honors work is considered to be above and beyond regular graduation standards.

URBANST 201 or 202 should be taken during the junior 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. All 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; or 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 above.

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, Communications, 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.

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 policymaking, 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 must also complete an academic course of study consisting of small tutorials taught by policy experts, and weekly policy seminars taught by Stanford faculty members. Seminars are generally 3 -5 units. Past seminar topics have included Congressional Oversight and the Press; Economic Growth & Development Patterns, Policies, and Prospects; Critical Health Issues in the U.S. and Abroad; Policymaking in the Washington Community; and Criminal Justice Policy. Frequently, speakers from the Washington policy community join students and faculty for discussions. Students usually 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.

Stanford in Washington 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. To attend SIW during Autumn Quarter, apply early Winter Quarter of the previous year. For Winter Quarter, apply early Spring Quarter of previous year. For Spring Quarter, apply early Autumn Quarter. Students interested in the program should contact the Public Policy Program, Encina Hall West, room 204, (650) 725-0109, or email publicpolicy@stanford.edu.

SCHOOL OF LAW

Emeriti: (Professors) Barbara Allen Babcock, Wayne G. Barnett, John H. Barton, Paul Brest, William Cohen, Lance E. Dickson, Marc A. Franklin, Jack H. Friedenthal, Robert A. Girard, William B. Gould IV, Thomas C. Grey, John Henry Merryman, Margaret Jane Radin, David Rosenhan, Kenneth E. Scott, Byron D. Sher, William H. Simon, Michael S. Wald, Howard R. Williams
Dean: Larry D. Kramer
Vice Dean: Mark G. Kelman
Associate Dean for Curriculum: Norman W. Spaulding
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: Faye Deal, Catherine Glaze, Sabrina Johnson, Susan Robinson, Scott Showalter
Professors: Janet Cooper Alexander, Joseph Bankman, R. Richard Banks, Gerhard Casper (on leave), Joshua Cohen, G. Marcus Cole (on leave), Richard Craswell, Mariano-Florentino Cuéllar, Robert M. Daines, Michele Landis Dauber, George Fisher, Richard T. Ford (on leave Winter), Barbara H. Fried, Lawrence M. Friedman, Ronald J. Gilson (on leave Autumn), Paul Goldstein, Henry T. Greely, Joseph A. Grundfest, Thomas C. Heller, Deborah R. Hensler, Pamela S. Karlan, Mark G. Kelman, Amalia D. Kessler, Michael Klausner, Larry D. Kramer, Mark A. Lemley, Lawrence Lessig (on leave Autumn), Lawrence C. Marshall, Miguel A. Méndez, A. Mitchell Polinsky, Robert L. Rabin, Deborah L. Rhode, Jane Schacter, Norman W. Spaulding, James F. Strnad II, Kathleen M. Sullivan, Alan O. Sykes, Barton H. Thompson Jr., David G. Victor, Robert Weisberg
Associate Professors: Jenny S. Martinez, Alison D. Morantz
Assistant Professors: Daniel Ho, Barbara van Schewick, Michael W. Wara
Professors (Teaching): William S. Koski, Deborah A. Sivas
Associate Professors (Teaching): Juliet M. Brodie, Jeffrey L. Fisher, Jayashri Srikantiah
Senior Lecturers: Margaret R. Caldwell (on leave Autumn), Janet Martinez, David W. Mills, Helen Stacy, Allen S. Weiner
Professors (by courtesy): Daniel P. Kessler, Maureen F. McNichols, Paul C. Pfleiderer, Madhav Rajan, Jack Rakove, Rebecca Sandefur
Visiting Professors: Barton Beebe, Eric Feldman, Robert W. Gordon, Elizabeth E. Joh, Yifat Holzman-Gazit, Barbara Olshansky, Rogelio Perez-Perdomo, Laura Rosenbury, Adam Samaha, William H. Taft, IV, Neta Ziv
Legal Research and Writing Instructors: Brooke Coleman, John Greenman, Stephen Lee, Jeanne Merino, Andrea Roth, Nirej Sekon
Lecturers: Igor Abramov, Simao J. Avila, Marilyn Bautista, Jeanine Becker, John Crawford, Kara Dansky, Michael Dickstein, Randee G. Fenner, Jeremy Fogel, David Forst, Larry Franklin, Edward Frueh, James Fuller, Mia Gechlik, Thomas C. Goldstein, Jennifer Granick, Jonathan Greenberg, Kristin Grenfell, Lucas Guttentag, Timothy H. Hallahan, Amy Howe, Joel Hyatt, Erik Jensen, David Johnson, Danielle Jones, Julie Kennedy, Jason Kipnis, Suzanne Klahr, Jeffery Kobrick, Charles Koob, Paul Lomio, Amichai Magen, Beth McLellan, Jeanne Merino, Jay Mitchell, Richard Morningstar, Roberta J. Morris, Linda Netsch, Tom Nolan, Jessica Notini, Ralph Pais, Moira Paz, B. Howard Pearson, Lisa M. Pearson, Stephan Ray, Melissa Rodgers, Michael Romano, Stephen Rosenbaum, Matthew Rossiter, Kevin Russell, Richard Salgado, Ticien Sassoubre, Dan Siciliano, Rachelle Silverberg, Brenda Simon, Smita Singh, Stephanie Smith, John Steele, Larry Stein, Erika Wayne, Dana Weintraub, Kate Wilko, George D. Wilson, Katherine C. Wright
Affiliated Faculty: Anne Beyer (Graduate School of Business), Alexandria Boehm (Engineering), Judith Goldstein (Political Science, SIEPR), Joy Ishii (Graduate School of Business)

Courses offered by the School of Law have the subject code LAW or LAWGEN, and are listed in the "Courses in Law" section of this bulletin.

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 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 Degree" section below.

The school is on a two-term academic calendar: Autumn term classes begin on September 2, 2008, and the term ends on December 3, 2008. Winter term classes begin on January 5, 2009, and the term ends on April 23, 2009. In addition, the Law School offers classes on the quarter schedule. Law classes taught on the Autumn Quarter schedule begin September 22, 2008 and end on December 5, 2008; Law classes taught on the Winter Quarter schedule begin January 5, 2009 and end on March 13, 2009.

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. Interdisciplinary Graduate Program in Environment and Resources (IPER)
J.D./Ph.D. Interdisciplinary Graduate Program in Environment and Resources (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

SCHOOL OF MEDICINE

Dean: Philip Pizzo
Senior Associate Dean for Graduate Education and Postdoctoral Affairs: John Pringle
Senior Associate Dean for Medical Student 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 strong background in the life sciences are welcome. Among these offerings are Stanford Introductory Seminars for freshmen and sophomores; interested students are encouraged to peruse the complete list of these offerings in the "Stanford Introductory Seminars" section of this bulletin or at http://www.stanford.edu/group/introsems.

GRADUATE PROGRAMS IN THE SCHOOL OF MEDICINE

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 bioscience. 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. 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 may be obtained from Graduate Admissions, Office of the University Registrar, Stanford University, 630 Serra Street, Suite 120, Stanford, CA 94305-6032, or 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, and opportunities for pursuing a second degree, such as an M.P.H. or 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 can be 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 full tuition; the joint M.D./Ph.D. degree requires 16 quarters. All additional quarters are charged at the reduced Terminal Medical Registration (TMR) tuition rate, which is $2,169 per quarter in 2008-09. 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 individualization of curricular and research programs for each trainee. Training for a combined M.D./Ph.D. should include the same content encountered by students who pursue each degree separately, but the total training time should be 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 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 so they are more able 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 mentor to discuss translational research needs and help to arrange a short clinical experience. Upon completion of the Ph.D., 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 Professor: Aaron F. Straight
Courtesy Professors: Chaitan S. Khosla, Sharon Long

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 have the subject code BIOC, and are listed in the "Biochemistry (BIOC) Courses" section of this bulletin.

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 undergraduate, 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, utilizing 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 utilizes a variety of organisms, from bacteria to animal cells.

GRADUATE PROGRAM IN BIOCHEMISTRY

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 analytical, 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 2.

Applications should be submitted at http://gradadmissions.stanford.edu. Applicants are notified by March 27 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 either 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, Christopher T. Scott, Audrey Shafer, Sara L. Tobin, Abraham C. Verghese, Lawrence I. Zaroff

Center Offices: 701 Welch Road, Building A, Suite 1105
Mail Code: 94304-5748
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 2 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 directors, David Magnus, PhD, and Audrey Shafer, MD. 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 E. Klein, David Paik, Daniel L. Rubin

Participating Faculty and Staff by Department:

Research opportunities are not limited to faculty and departments listed.

Anesthesia: David M. Gaba (Professor)

Biochemistry: Douglas L. Brutlag (Professor, emeritus), Ronald Davis (Professor), James Ferrell (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: 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), Balaji Srinivasan (Lecturer), Terry Winograd (Professor)

Developmental Biology: Gill Bejerano (Assistant Professor), Stuart Kim (Professor), Harley McAdams (Professor, Research)

Genetics: Russ B. Altman (Professor), Mike Cherry (Associate Professor, Research), Stanley N. Cohen (Professor), Ronald Davis (Professor), Stuart Kim (Professor), Teri E. Klein (Senior Research Scientist), Gavin Sherlock (Assistant 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), 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), David Katzenstein (Professor, Research), 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 (Associate Professor), Julie Theriot (Associate Professor)

Pathology: Arend Sidow (Associate Professor)

Pediatrics: Atul Butte (Assistant Professor)

Psychiatry and Behavioral Sciences: Amar K. Das (Assistant Professor), Vinod Menon (Associate Professor)

Radiation Oncology: Lei Xing (Associate Professor, Research)

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 (Clinical Assistant Professor), Geoffrey Rubin (Associate Professor)

Statistics: Trevor J. Hastie (Professor), Susan Holmes (Professor), Art Owen (Professor), Balaji Srinivasan (Lecturer), Robert Tibshirani (Professor), Michael G. Walker (Consulting Associate Professor), Nancy Zhang (Assistant Professor)

Structural Biology: Michael Levitt (Professor)

Surgery: Thomas Krummel (Professor), Charles A. Taylor (Associate Professor, Research)

Program Offices: Medical School Office Building (MSOB), room X- 215, 251 Campus Drive

Mail Code: 94305-5479

Phone: (650) 723-6979

Fax: (650) 725-7944

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

Courses offered by the Program in Biomedical Informatics have the subject code BIOMEDIN, and are listed in the "Biomedical Informatics (BIOMEDIN) Courses" section of this bulletin.

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 outlined below, 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 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 outlined below must be justified in writing and approved by the student's Biomedical Informatics academic adviser and the chair of the Biomedical Informatics 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.

MASTER OF SCIENCES 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 students have had by matriculation 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 121 or another artificial intelligence or machine learning class, CS 161 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 selected 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 any combination of at least three courses that span 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 120, 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). Specific courses should be chosen in consultation with the student's academic adviser. Also recommended is a course in the psychology of human problem solving.
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 selected 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, typically supported with fellowship funding. 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 primarily designed 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 of 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 only available 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 Interdisciplinary 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. 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. At the completion of training, the student gives a final talk describing his or her results.
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 required 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.

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)

Program Office: 4235A 269 Campus Drive
Mail Code: 94305-5173
Phone: (650) 723-6198
Email: dalima@stanford.edu
Web Site: http://www.stanford.edu/group/cancerbio

Courses offered by the Cancer Biology Program have the subject code CBIO, and are listed in the "Cancer Biology (CBIO) Courses" section of this bulletin.

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

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, James P. Whitlock
Chair: James E. Ferrell, Jr.
Professors: James E. Ferrell, Jr., Tobias Meyer, Daria Mochly-Rosen, Richard A. Roth
Associate Professor: Karlene A. Cimprich
Assistant Professors: James K. Chen, Thomas J. Wandless, Joanna K. Wysocka
Courtesy Professors: Stuart Kim, Beverly S. Mitchell, Paul A. Wender
Courtesy Associate Professor: Calvin J. Kuo
Courtesy Assistant Professors: Matthew Bogyo, Marcus Covert
Consulting Professor: Juan Jaen

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

Courses offered by the Department of Chemical and Systems Biology have the subject code CSB, and are listed in the "Chemical and Systems Biology (CSB) Courses" section of this bulletin.

In Autumn of 2006, the Department of Molecular Pharmacology changed its name to become the Department of Chemical and Systems Biology. The department has established a new Ph.D. program in Chemical and Systems Biology. Molecular Pharmacology Ph.D. students who enrolled prior to Autumn 2007 have the option of receiving their Ph.D. in either Molecular Pharmacology or Chemical and Systems Biology. Ph.D. students matriculating in Autumn 2007 and thereafter are admitted to Chemical and Systems Biology. Further details about degree requirements are available from the department.

GRADUATE PROGRAMS IN CHEMICAL AND SYSTEMS BIOLOGY

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: Linda C. Cork
Professor: Linda C. Cork, Donna Bouley, Sherril Green
Associate Professors: Paul Buckmaster, Corinna Darian-Smith, Shaul Hestrin
Assistant Professors: 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 have the subject code COMPMED, and are listed in the "Comparative Medicine (COMPMED) Courses" section of this bulletin.

The Department of Comparative Medicine is a clinical department that offers residency training in laboratory animal medicine for veterinarians, although it does not offer degrees. Its faculty offer courses at the undergraduate and graduate levels and participate in teaching in other departments. Both clinical faculty members, who are specialists in a veterinary medical specialty, and basic science faculty also accept students to participate in ongoing research projects within the department and assist students with special research projects.

The discipline of Comparative Medicine use the differences and similarities among species to understand biologic and disease mechanisms. It incorporates spontaneous or induced disease models as one of several approaches to research. The research interests of faculty are in neuroscience, infectious diseases, neuropathology, cancer, and molecular genetics.

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, Irving Weissman
Associate Professors: Seung Kim, Anne Villeneuve
Assistant Professors: Gill Bejerano, Joanna Wysocka
Professor (Teaching): Ellen Porzig
Professor (Research): Harley McAdams

Courses offered by the Department of Development Biology have the subject code DBIO, and are listed in the "Developmental Biology (DBIO) Courses" section of this bulletin.

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.

GRADUATE PROGRAMS IN DEVELOPMENTAL BIOLOGY

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
Interim Chair: John Pringle
Professors: Russ Altman, Gregory Barsh, 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, James Ford, Arend Sidow, Anne Villenueve, Douglas Vollrath
Assistant Professors: Julie Baker, Anne Brunet, Julien Sage, Man-Wah Tan, Hua Tang
Professor (Research): Leonore Herzenberg

Associate Professors (Research): J. Michael Cherry, Zijie Sun
Assistant Professor (Research): Gavin Sherlock
Courtesy Professor: Hank Greely
Consulting Professor: David Cox

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 have the subject code GENE, and are listed in the "Genetics (GENE) Courses" section of this bulletin.

GRADUATE PROGRAMS IN GENETICS

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. 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 (MED 250A, MED 255, DBIO 201, and GENE 238), and are encouraged to take 3-4 elective courses of their choice. 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, Richard A. Olshen, Julie Parsonnet, Robert Tibshirani, Alice S. Whittemore, Dee W. West, Wing Wong
Associate Professor: Lorene M. Nelson
Assistant Professors: M. Kate Bundorf, Marc Coram, Allison Kurian, Mei-Chiung Shih, Weiva Sieh
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: Michael K. Gould, Paul Heidenreich, David R. Rogosa
Courtesy Assistant Professors: Jay Bhattacharya, 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

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Phone: (650) 723-5456
Web Site: http://hrp.stanford.edu

Courses offered by the Department of Health Research and Policy have the subject code HRP, and are listed in the "Health Research and Policy (HRP) Courses" section of this bulletin.

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), 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, Political Economy of Health Care in the United States; 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 and HRP 262 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
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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. Most core faculty and academic teaching staff are administratively housed within the Department of Health Research and Policy. Affiliated faculty come from a large number of Stanford University departments and centers, and from notable Bay Area research facilities. The program seeks students with the potential to be future leaders in clinical and translational research, epidemiology, and allied disciplines. The program provides researchers from

diverse clinical backgrounds the knowledge and skills to become clinical investigators; it also offers an introduction to epidemiology for individuals with research experience in the behavioral and social sciences and for others without a clinical background. Research strengths include cancer epidemiology, cardiovascular disease epidemiology, infectious disease epidemiology, musculoskeletal disease epidemiology, neuroepidemiology, and aspects of epidemiologic methods, genetic epidemiology, reproductive epidemiology and women's health, and environmental and occupational epidemiology. The Program receives K12 and T32 support through a Clinical and Translational Science Award from the Stanford Center for Clinical and Translational Education and Research (SCCTER).

Two academic tracks lead to the M.S. degree; these tracks are not declared on Axess and they do not appear on the transcript or the diploma. The Clinical Research track is for physicians and others with specific interests in clinical and translational research. Students in this track receive training in epidemiologic methods, statistical analysis, and other areas essential to patient-oriented clinical research. These students are usually clinical investigators with an M.D. or comparable clinical degree, often in the fellowship stage of their postgraduate training, or in an early stage of faculty development. Typically, they are anticipating careers in academic medicine. The Traditional track serves students without prior clinical training. One category of such students consists of behavioral and social scientists who wish to bring an epidemiologic orientation to their research. Students pursuing a Ph.D. in these disciplines may wish to consider a concurrent master's degree in Epidemiology. The Traditional track also serves as an introduction to epidemiology for students with baccalaureate degrees who are considering careers in epidemiology or a related discipline.

University requirements for the M.S. degree are described in the "Graduate Degrees" section of this bulletin.

To receive the M.S. degree, students in both instructional tracks are expected to obtain a grounding in epidemiologic methods and applied biostatistics and to demonstrate research skills through the completion of a master's thesis. Required courses are HRP 225, Design and Conduct of Clinical and Epidemiologic Studies; HRP 226, Advanced Epidemiologic and Clinical Research Methods; HRP 236, Epidemiology Research Seminar, 3 units required); HRP 259, Introduction to Probability and Statistics for Epidemiology; HRP 261, Intermediate Biostatistics; HRP 262, Regression, Prediction, Survival Analysis; and a master's thesis with 12 or more units. Students in the Clinical Epidemiology track must also complete HRP 251, Design and Conduct of Clinical Trials; and MED 255, Responsible Conduct of Research. Students are required to select at least two other courses in Epidemiology. Students are assigned a methodology mentor, who is usually from the Department of Health Research and Policy, and they also select a research mentor, who may be from another department. For the students in the Clinical Research Epidemiology track, the research mentor is often an affiliated faculty member from the department of the student's clinical specialty. Other programmatic requirements are described 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, Surgery)
Director for Clinical Immunology Program: C. Garrison Fathman (Medicine/Immunology and Rheumatology)

Participating Departments and Faculty:

Biology: Anthony W. De Tomaso (Assistant Professor), Patricia P. Jones (Professor)
Chemistry: Harden M. McConnell (Professor, emeritus)*
Genetics: Lenore A. Herzenberg (Professor, Research), Leonard A. Herzenberg (Professor, emeritus), Man-wah Tan (Assistant Professor)
Medicine/Bone Marrow Transplantation Program: Robert Negrin (Professor), David Miklos (Assistant Professor), Judith Shizuru (Associate Professor)
Medicine/Endocrinology: Ajay Chawla (Assistant Professor)
Medicine/Hematology: Calvin Kuo (Associate Professor), Peter Lee (Associate Professor)
Medicine/Immunology and Rheumatology: C. Garrison Fathman (Professor), William Robinson (Assistant Professor), Samuel Strober (Professor), Paul J. Utz (Associate 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)
Microbiology and Immunology: Chang-Zheng Chen (Assistant Professor), Yueh-Hsiu Chien (Professor), Mark M. Davis (Professor), Hugh McDevitt (Professor), Garry P. Nolan (Professor), David Schneider (Assistant 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)
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 (Associate Professor), Raymond A. Sobel (Professor), Irving L. Weissman (Professor, Developmental Biology, and Director, Institute for Stem Cell Biology and Regenerative Medicine)
Pediatrics: Ann Arvin (Professor, and Microbiology and Immunology), Christopher Contag (Associate Professor, Research, and Microbiology and Immunology, and Radiology), David B. Lewis (Professor), Elizabeth Mellins (Associate Professor)
Psychiatry and Behavioral Sciences: Firdaus Dhabhar (Associate Professor)
Structural Biology: Peter Parham (Professor, and Microbiology and Immunology)
Surgery: Sheri Krams (Associate Professor, Research), Olivia Martinez (Professor, Research)

* Recalled to active duty

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Courses offered by the Immunology Program have the subject code IMMUNOL, and are listed in the "Immunology (IMMUNOL) Courses" section of this bulletin.

GRADUATE PROGRAMS IN IMMUNOLOGY

MASTER OF SCIENCE IN IMMUNOLOGY

Students in the Ph.D. program in Immunology may apply for an M.S. degree in Immunology, 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 3 faculty members.
4. Course work in Immunology as follows: basic immunology (for graduate students, BIO 230A, Molecular and Cellular Immunology Literature Review, and for medical students, IMMUNOL 205, Immunology in Human Health and Disease or equivalent), advanced Immunology such as IMMUNOL 201, 200, and 203. 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; or DBIO 210, Developmental Biology. Other required core courses are: GENE 203, Advanced Genetics;

IMMUNOL 215, Principles of Biological Technologies; and MCP 221, Cell Biology of Physiological Processes.
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 weekly Immunology seminar 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 mid-June, first year; the thesis proposal (qualifying examination process, Part II), before December 15th, second year. In addition, an oral presentation is required on the research of one rotation, early-July, first year.

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 2. 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 2.

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 once a year.

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a three-year program of study that includes 72 units of graduate course work and research. At least 3 units must be taken with each of four different Stanford faculty members.

The 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. Biochemistry and Molecular Biology (BIOC 220)
   d. Advanced Genetics (GENE 203)
   e. Cell Biology of Physiological Processes (MCP 221)
   f. Biostatistics (BIO 141)
   g. Principles of Biological Technologies (IMMUNOL 215)
   h. 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.
   i. Responsible Conduct in Science (MED 255)
   j. Immunology Journal Club (IMMUNOL 305)
3. 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. 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. Students who have not yet achieved TGR status must register for 1 unit for IMMUNOL 311. Students attend the weekly Immunology Seminar Series (4-5 p.m., Tuesdays). Students read the papers of and have dinner with visiting seminar speakers two or three times each quarter, and meet to discuss the material.
4. 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.
5. Completion in the first year of three one quarter rotations. Two weeks after taking the comprehensive written examination (part 1 of the qualifying examination process) in mid-June, students, including MSTP and M.D./Ph.D. students, present their lab rotation research projects to the predoctoral committee. Medical students who have declared Immunology as their scholarly concentration major, and who are accepted later into the Ph.D. program, must do at least three rotations.
6. 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 undertake 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.
7. For admission to Ph.D. candidacy, a comprehensive written examination (qualifying examination process, Part I) in immunology and related biomedical sciences, 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 15th, 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 for advising the student through the research and other courses as needed towards the completion of the Ph.D. dissertation.
8. Participation (through regular attendance and oral presentation) in the student-run immunology journal clubs for at least the first 2 years (IMMUNOL 305). First- through fourth-year students are also expected to attend the graduate students' journal club, the Tuesday evening immunology seminars, and the annual Stanford Immunology Scientific Conference at Asilomar. Students are required to give one poster and one scientific presentation at these annual Stanford Immunology scientific conferences.
9. 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.
10. 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) Edward S. Mocarski, Sidney Raffel, Leon T. Rosenberg
Chair: Karla Kirkegaard
Associate Chair: Hugh O. McDevitt
Professors: Ann Arvin, Helen Blau, John C. Boothroyd, Yueh-Hsiu Chien, Mark M. Davis, Stanley Falkow, Stephen J. Galli, Harry B. Greenberg, Karla Kirkegaard, A. C. Matin, Hugh O. McDevitt, Peter Parham, Phillip Pizzo, Charles Prober, David Relman, Peter Sarnow, Gary K. Schoolnik, Lucy S. Tompkins
Associate Professors: Christopher Contag, Garry Nolan, David Schneider, Julie Theriot
Assistant Professors: Manuel Amieva, Matthew Bogyo, Chang-Zheng Chen, Denise Monack, Upinder Singh, Justin Sonnenburg, Man-Wah Tan
Associate Professor (Teaching): Robert D. Siegel

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 have the subject code MI, and are listed in the "Microbiology and Immunology (MI) Courses" section of this bulletin.

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 2.

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 209, Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites, Part I; and MI 210, Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites, Part II. 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 MCP 221/BIO 214, Cell Biology of Physiological Processes.

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: Richard S. Lewis
Professors: Axel T. Brunger, Brian K. Kobilka, Richard S. Lewis, W. James Nelson, Stephen J. Smith, Richard W. Tsien, William Weis
Associate Professors: Christopher Garcia, V. Daniel Madison
Assistant Professors: Miriam Goodman, Merritt Maduke
Courtesy Associate Professors: Stefan Heller, John Huguenard, Anson W. Lowe, Tony Ricci
Courtesy Assistant Professor: Richard J. Reimer

Department Offices: Beckman Center, B100
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Web Site: http://mcp.stanford.edu

Courses offered by the Department of Molecular and Cellular Physiology have the subject code MCP, and are listed in the "Molecular and Cellular Physiology (MCP) Courses" section of this bulletin.

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 255, 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: William T. Newsome
Professors: Ben Barres, Eric I. Knudsen, William T. Newsome
Associate Professor: Jennifer Raymond
Assistant Professors: Stephen Baccus, Thomas Clandinin, Ricardo Dolmetsch, Tirin Moore

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Courses offered by the Department of Neurobiology have the subject code NBIO, and are listed in the "Neurobiology (NBIO) Courses" section of this bulletin.

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, Miriam Goodman, John R. Huguenard, Jennifer Raymond, Carla Shatz, Kang Shen, Anthony Wagner

Participating Faculty:

Anesthesia: Rona Giffard (Professor), M. Bruce MacIver (Associate Professor, Research), Sean Mackey (Assistant Professor), David Yeomans (Associate Professor)
Applied Physics: Mark Schnitzer (Assistant Professor)
Bioengineering: Kwabena Boahen (Associate Professor), Karl Deisseroth (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 (Assistant Professor), Shaul Hestrin (Associate Professor)
Developmental Biology: Ben Barres (Professor), David Kingsley (Professor), Matthew P. Scott (Professor)
Electrical Engineering: Krishna Shenoy (Assistant Professor)
Genetics: Anne Brunet (Assistant Professor), David R. Cox (Professor), Matthew Scott (Professor)
Microbiology and Immunology: Helen Blau (Professor)
Molecular and Cellular Physiology: Axel Brunger (Professor), Miriam B. Goodman (Assistant 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 (Assistant Professor), Ricardo Dolmetsch (Assistant Professor), Eric I. Knudsen (Professor), U. J. McMahan (Professor), Tirin Moore (Assistant Professor), William T. Newsome (Professor), Jennifer Raymond (Assistant 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), Ting-Ting Huang (Assistant Professor, Research), John A. Huguenard (Professor), Frank Longo (Professor), William C. Mobley (Professor), Josef Parvizi (Assistant Professor), David A. Prince (Professor), Thomas A. Rando (Associate Professor), Lawrence Recht (Professor), Richard Reimer (Assistant Professor), Terence Sanger (Assistant Professor), Robert M. Sapolsky (Professor), Lawrence Steinman

(Professor), Tony Wyss-Coray (Associate Professor, Research), Yanmin Yang (Assistant Professor)
Neurosurgery: Marion Buckwalter (Assistant Professor), Pak H. Chan (Professor), Theo Palmer (Assistant Professor), Gary K. Steinberg (Professor)
Otolaryngology: Stefan Heller (Associate Professor), Anthony Ricci (Associate Professor)
Pathology: Isabella Graef (Assistant Professor), Bingwei Lu (Assistant Professor), Raymond Sobel (Professor)
Pediatrics: Heidi Feldman (Professor), Anna Penn (Assistant Professor), Lawrence Steinman (Professor)
Psychiatry and Behavioral Sciences: Karl Deisseroth (Assistant Professor), Luis de Lecea (Associate Professor), Firdaus Dhabhar (Associate Professor), Craig Garner (Professor), Terrence A. Ketter (Associate 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 (Associate Professor), Brian Knutson (Assistant 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: CCSR 4235c
Mail Code: 94305-5173
Phone: (650) 723-9855
Web Site: http://neuroscience.stanford.edu/education/phd_program

Courses offered by the Neurosciences Program have the subject code NEPR, and are listed in the "Neurosciences (NEPR) Courses" section of this bulletin.

GRADUATE PROGRAM IN NEUROSCIENCES

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 have the subject code OBGYN, and are listed in the "Obstetrics and Gynecology (OBGYN) Courses" section of this bulletin.

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)* P. Joanne Cornbleet, Lawrence F. Eng, Luis Fajardo, Heinz Furthmayr, F. Carl Grumet
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, Sabine Kohler, Jon C. Kosek, 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, Athena M. Cherry, Andrew Connolly, Tina Cowan, James D. Faix, Dean Felsher, Susan A. Galel, Sharon M. Geaghan, John P. Higgins, Peter K. Jackson, Christina Kong, Teri A. Longacre, Sara A. Michie, Yasodha Natkunam, Bruce Patterson, Jonathan R. Pollack, Arend Sidow
Assistant Professors: Matthew Bogyo, Raffick Bowen, Soheil Dadras, Magali Fontaine, Tracy George, Kristin Jensen, Neeraja Kambham, Bingwei Lu, Jesse McKenney, Iris Schrijver, Erich Schwartz, Uma Sundram, Robert West
Courtesy Professors: Bertil Glader, Lucy Tompkins
Courtesy Associate Professors: Donna Bouley, Robert Shafer
Clinician Educators: Susan Atwater, David Bingham, Barbara Egbert, Dita Gratzinger, Terri Haddix, Amy McKenney, Melanie Manning, Reetesh Pai, Shalini Pereira, Run Shi, Brent Tan, Maurene Viele
Instructors: Niaz Banaei, Daniel Kraft, Michaela Liedtke
Adjunct Clinical Faculty: Robert Archibald, Jerome S. Burke, Glenn Cockerham, Stephen Shi-Hua Chen, Seth Haber, Maie K. Herrick, Paul W. Herrmann, Simon Hirschl, Charles Lombard, John E. McNeal, Judy Melinek, Joseph O'Hara, 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 have the subject code PATH, and are listed in the "Pathology (PATH) Courses" section of this bulletin.

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 have the subject code RADO, and are listed in the "Radiation Oncology (RADO) Courses" section of this bulletin.

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.

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, Barton Lane, Gerald Friedland, David A. Goodwin, Henry H. Jones, Albert Macovski, I. Ross McDougall, Robert E. Mindelzun, William H. Northway, Lewis Wexler, Leslie M. Zatz
Chair: Gary M. Glazer
Professors: Scott W. Atlas, Richard A. Barth, Christopher F. Beaulieu, Sanjiv Sam Gambhir, Gary M. Glazer, Gary H. Glover, Michael L. Goris, Robert J. Herfkens, Debra M. Ikeda, R. Brooke Jeffrey, Ann Leung, Michael Marks, Michael Moseley, Sandy Napel, Matilde Nino-Murcia, Norbert J. Pelc, Geoffrey Rubin, George Segall, F. Graham Sommer
Associate Professors: Patrick D. Barnes, Francis Blankenberg, Bruce Daniel, Terry Desser, Huy M. Do, Nancy Fischbein, Dominik Fleischmann, Garry E. Gold, Lawrence Hofmann, Beverley Newman, Eric W. Olcott, Daniel M. Spielman, Daniel Y. Sze
Associate Professors (Research): Kim Butts-Pauly, Craig Levin, Sylvia Plevritis
Assistant Professors: Sandip Biswal, Frandics P. Chan, Nishita Kothary, William Kuo, Andrew Quon, Jiaanghong Rao, Justus Roos, Lewis Shin, Kathryn J. Stevens, Shreyas Vasanawala, Joseph Wu, Greg Zaharchuk
Assistant Professors (Research): Roland Bammer, Xiaoyuan Chen, Rebecca Fahrig, Samira Guccione, Brian Hargreaves, David Paik

Web Site: http://www-radiology.stanford.edu

Courses offered by the Department of Radiology have the subject code RAD, and are listed in the "Radiology (RAD) Courses" section of this bulletin.

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.

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
Associate Professor: K. Christopher Garcia
Associate Professor (Research): Yahli Lorch
Professor (Teaching): Patricia Cross
Courtesy Professors: Axel Brunger, Uel J. McMahan
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 have the subject code SBIO, and are listed in the "Structural Biology (SBIO) Courses" section of this bulletin.

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.

GRADUATE PROGRAMS IN STRUCTURAL BIOLOGY

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

2008-09

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.

Changes to course offerings announced in the *Stanford Bulletin* are available online at http://bulletin.stanford.edu, online in Axess, Stanford's Student Information System, at http://axess.stanford.edu, and printed in the *Time Schedule of Classes* issued quarterly.

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* web site at http://bulletin.stanford.edu which is updated on a quarterly basis.

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 the courses section of the relevant subject code.

TIME SCHEDULE OF CLASSES

Each quarter, the Office of the University Registrar produces a printed *Time Schedule of Classes*. Students should consult Axess at http://axess.stanford.edu for the most up-to-date class scheduling information.

AERONAUTICS AND ASTRONAUTICS (AA) COURSES

For information on undergraduate and graduate programs in the Department of Aeronautics and Astronautics, see the "Aeronautics and Astronautics" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN AERONAUTICS AND ASTRONAUTICS

AA 100. Introduction to Aeronautics and Astronautics
The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including take-off, 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 (MacCormack, R)

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 from Odysseus's bow to modern skis; 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 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 200A. Applied Aerodynamics
Fundamental equations of fluid dynamics and the physical assumptions on which they are based; overview of appropriate methods for solving these equations including nonlinear CFD, linear panel and vortex methods; estimation of pressure distributions and resultant airloads on 2-D airfoils, finite wings, slender bodies, and lifting systems; compressibility effects; boundary layer analysis and prediction of drag, separation, and displacement effects. Application to airfoil and wing design. Prerequisite: undergraduate aeronautics course. Recommended: 210A.
3 units, Win (MacCormack, R)

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
The fundamental principals 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, not given this year

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, Win (Alonso, J)

AA 214A. Numerical Methods in Fluid Mechanics
Principles underlying the Navier-Stokes equations. Relations between time-accurate and relaxation methods. Implicit and explicit methods combined with flux splitting and space factorization. Considerations of accuracy, stability of numerical methods, and programming complexity. Prerequisites: linear algebra and CME 200, 204, or equivalents with consent of instructor.

3 units, Aut (Pulliam, T)

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 (Staff)

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 (Staff)

AA 236C. Spacecraft Design Laboratory

3 units, Spr (Staff)

AA 236D. Spacecraft Design Laboratory
Continuation of the 236A,B,C. Emphasis is on practical application of systems engineering to the life cycle program of spacecraft design, testing, launching, and operations. Prerequisites: 236A and consent of instructor.

3 units, Sum (Staff)

AA 238. Human-Centered Design for Aerospace Engineers
The what, when, who, and how of human-centered design. Is it art, magic, science, or engineering? How to integrate human-centered processes into engineering design processes. Analysis of recent human-centered aeronautical and space systems to evaluate successes and limitations.

3 units, Win (Null, C)

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; Alonso, J)

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.

3-4 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 (Kroo, I; Alonso, J)

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, Win (Mitiguy, P)

AA 242B. Advanced Dynamics

(Same as ME 331B.) Formulation of equations of motion with Newton/Euler equations; angular momentum principle; D'Alembert principle; power, work, and energy; Kane's method; and Lagrange's equations. Numerical solutions of nonlinear algebraic and dfferential equations govering the behavior of multiple degree of freedom systems. Computed torque control.

3 units, Spr (Mitiguy, P)

AA 243. Modern Dynamics

Vector fields on manifolds. Curvilinear coordinate transforms. Tensor calculus. Lagrangian and Hamiltonian systems. Symmetry groups and conservation laws. Holonomic and non-holonomic constraints. Unilateral constraints and contact. Invariant structures in phase space. Linearized dynamics. Linear and nonlinear stability. Prerequisite: 242A.

3 units, not given this year

AA 246. Computational Impact and Contact Modeling

Rigid body contact including multi-body impact, persistent contact, complementarity formulations, and solution techniques. Impact of elastic bodies using finite elements including penalty and mixed constraint formulations, solution techniques, and time-stepping methods. Shocks and vibration induced by impact. Friction and plasticity models for impact and persistent contact. Prerequisites: 242A, 242B or equivalent, familiarity with MATLAB.

3 units, not given this year

AA 247. Innovation for Aerospace and Space Exploration

How advancing technology needs have stimulated innovation in the aerospace industry. Guest speakers address their own experiences and their vision for those needs which can only be satisfied by innovations. May be repeated for credit.

1 unit, Aut (Twiggs, R)

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)

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, Win (Weiss, S)

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, Spr (Alonso, J; Kroo, I)

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 aero-dynamics; 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.

3 units, Win (Enge, P)

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.

3 units, Spr (Enge, P)

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.

5 units, Aut (Zilliac, G)

AA 284C. Propulsion System Design Laboratory
Continuation of 284A,B. Prerequisite: 284B, and consent of instructor.

3 units, Win (Zilliac, G)

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. 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, Aut (Staff), Win (Staff), Spr (Staff)

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.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AFRICAN AND AFRICAN AMERICAN STUDIES (AFRICAAM) COURSES

For information on undergraduate programs in the Program in African and African American Studies, see the "African and African American Studies" section of this bulletin.

UNDERGRADUATE COURSES IN AFRICAN AND AFRICAN AMERICAN STUDIES

AFRICAAM 12. Presidential Politics: Race, Class, Faith, and Gender in the 2008 Election
(Same as CSRE 12.) From the 2008 nomination process to the election between Senators John McCain and Barack Obama.The complexities of identity and its role in uniting and dividing the electorate. Panels covering the media, political participation, and group affiliation.

1-3 units, Aut (Elam, M; Snipp, C)

AFRICAAM 40. The Muse, Musings, and Music
Internal and external sources of inspiration and the practice of applying them through creative expression. Creativity as an act of manifestation in daily life. Writing exercises, improvisation games. Students perform their poetry, music, and visual art. Final class project.

3-5 units, Aut (Staff), given once only

AFRICAAM 75. Black Cinema
How filmmakers represent historical and cultural issues in Black cinema.

2 units, Spr (Barker-Alexander, J)

AFRICAAM 101. African American Lecture Series: Race and Faith
Weekly lectures on African or African American artistic expression, culture, history, language, literature, music, politics, religion and society. One unit for attendance at lecture reading and submission of brief response papers. Additional units require participation in discussion sections, readings, and the opportunity to conduct and record interviews with speakers in the lecture series for the AAAS archives. May be repeated for credit.

1-3 units, Spr (Staff)

AFRICAAM 105. Introduction to African and African American Studies
(Same as ENGLISH 143E, 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, Win (Elam, M; Carson, C)

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 144. African Women Writers
The intricacy and diversity of contemporary African women's writings. Focusis on fiction from various regions of Africa. Authors include Dangarembga, Ba, Okunit, Vera, Head, Aidoo, and El Saadawi. Theoretical readings locate the writings within historical, philosophical, and aesthetic traditions.
5 units, Spr (Powell, P), given once only

AFRICAAM 145. Writing Race, Writing Faith: The Poetics and Politics of Spirituality in Black Literature
How spirituality functions thematically and aesthetically in black literature; how different spiritual practices are articulated in black diasporic communities. Theoretical readings locate the writings within the historical, philosophical and aesthetic traditions of the literature. Authors include DuBois, Marshall, Walker, Phillips, Brodber, and Johnson.
5 units, Win (Staff), given once only

AFRICAAM 152. W.E.B. DuBois as Writer and Philosopher
(Same as ENGLISH 152D, PHIL 194L.) Capstone seminar for Philosophy and Literature programs. Preference to majors in English, Philosophy, African and African American Studies, or the Philosophy and Literature programs. Life, career, thought, and writings of DuBois. Focus on the first half of his career, interactions among his early philosophical perfectionism, his work in social theory/social science, and his literary ambitions as an essayist and novelist. Sources include *Souls of Black Folk*, as well as his books on history and sociology, scholarly essays, and novels. GER:DB-Hum
5 units, Spr (Elam, M; Anderson, L)

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)

OVERSEAS STUDIES COURSES IN AFRICAN AND AFRICAN AMERICAN STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.rses to a major or minor program.

PARIS AFRICAN AND AFRICAN AMERICAN STUDIES COURSES

OSPPARIS 186F. Contemporary African Literature in French
4 units, Win (Guyot, S)

AFRICAN AND MIDDLE EASTERN LANGUAGES (AMELANG) COURSES

For more information, see the "African and Middle Eastern Languages Program" section of this bulletin.

UNDERGRADUATE COURSES IN AFRICAN AND MIDDLE EASTERN LANGUAGES

AMELANG 20A. Intensive Beginning Arabic, Part A
Stanford graduate students restricted to 9 units register for 220A,B,C.
5 units, Sum (Aweiss, S)

AMELANG 20B. Intensive Beginning Arabic, Part B
5 units, Sum (Aweiss, S)

AMELANG 20C. Intensive Beginning Arabic, Part C
Stanford graduate students restricted to 9 units register for 220A,B,C
5 units, Sum (Aweiss, S)

AMELANG 50A. Reading Hebrew, First Quarter
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, Aut (Shemtov, V)

AMELANG 50B. Reading Hebrew, Second Quarter
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, Win (Shemtov, V)

AMELANG 51A. Reading Biblical Hebrew, First Quarter
2 units, not given this year

AMELANG 100A. Beginning Amharic, First Quarter
3 units, Aut (Tesfamariam, I)

AMELANG 100B. Beginning Amharic, Second Quarter
3 units, Win (Tesfamariam, I)

AMELANG 100C. Beginning Amharic, Third Quarter
3 units, Spr (Tesfamariam, I)

AMELANG 101A. Intermediate Amharic, First Quarter
3 units, Aut (Tesfamariam, I)

AMELANG 101B. Intermediate Amharic, Second Quarter
3 units, Win (Tesfamariam, I)

AMELANG 101C. Intermediate Amharic, Third Quarter
3 units, Spr (Tesfamariam, I)

AMELANG 103A. Beginning Hausa, First Quarter
3 units, not given this year

AMELANG 103B. Beginning Hausa, Second Quarter
3 units, not given this year

AMELANG 103C. Beginning Hausa, Third Quarter
3 units, not given this year

AMELANG 106A. Beginning Swahili, First Quarter
4 units, Aut (Mohochi, E), Spr (Mohochi, E)

AMELANG 106B. Beginning Swahili, Second Quarter
4 units, Win (Mohochi, E)

AMELANG 106C. Beginning Swahili, Third Quarter
4 units, Spr (Mohochi, E)

AMELANG 107A. Intermediate Swahili, First Quarter
2-4 units, Aut (Mohochi, E)

AMELANG 107B. Intermediate Swahili, Second Quarter
2-4 units, Win (Mohochi, E)

AMELANG 107C. Intermediate Swahili, Third Quarter
2-4 units, Spr (Mohochi, E)

AMELANG 108A. Advanced Swahili, First Quarter
2-4 units, Aut (Mohochi, E)

AMELANG 108B. Advanced Swahili, Second Quarter
2-4 units, Win (Mohochi, E)

AMELANG 108C. Advanced Swahili, Third Quarter
2-4 units, Spr (Mohochi, E)

AMELANG 120A. Beginning Arabic, First Quarter
One-year sequence. Emphasis is on reading and writing standard Arabic (*fusha*).
5 units, Aut (Obeid, K)

AMELANG 120B. Beginning Arabic, Second Quarter
One-year sequence. Emphasis is on reading and writing standard Arabic (*fusha*).
5 units, Win (Obeid, K)

AMELANG 120C. Beginning Arabic, Third Quarter
Emphasis is on reading and writing standard Arabic (*fusha*).
5 units, Spr (Obeid, K)

AMELANG 121A. Intermediate Arabic, First Quarter
Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
2-4 units, Aut (Salti, R)

AMELANG 121B. Intermediate Arabic, Second Quarter
Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
2-4 units, Win (Salti, R)

AMELANG 121C. Intermediate Arabic, Third Quarter
Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.
2-3 units, Spr (Salti, R)

AMELANG 122A. Advanced Arabic, First Quarter
Language proficiency through use of complex and compound sentences. Media Arabic, literary works, the Arabic Internet, films, and cultural productions.
2-4 units, Aut (Aweiss, S)

AMELANG 122B. Advanced Arabic, Second Quarter
Language proficiency through use of complex and compound sentences. Arabic media and literary works.
2-4 units, Win (Aweiss, S)

AMELANG 122C. Advanced Arabic, Third Quarter
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 127. Land and Literature
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 and prose by Hebrew/Israeli authors in translation, and theoretical texts about place and literature. No knowledge of Hebrew required. GER:DB-Hum, EC-GlobalCom
4 units, not given this year

AMELANG 128A. Beginning Hebrew, First Quarter
5 units, Aut (Porat, G; Greif, E)

AMELANG 128B. Beginning Hebrew, Second Quarter
5 units, Win (Porat, G; Greif, E)

AMELANG 128C. Beginning Hebrew, Third Quarter
5 units, Spr (Porat, G)

AMELANG 129A. Intermediate Hebrew, First Quarter
4 units, Aut (Porat, G)

AMELANG 129B. Intermediate Hebrew, Second Quarter
4 units, Win (Porat, G)

AMELANG 129C. Intermediate Hebrew, Third Quarter
4 units, Spr (Porat, G)

AMELANG 130A. Advanced Hebrew, First Quarter
1-4 units, not given this year

AMELANG 130B. Advanced Hebrew, Second Quarter
1-4 units, not given this year

AMELANG 130C. Advanced Hebrew, Third Quarter
1-4 units, Spr (Porat, G)

AMELANG 133B. The African Forum, Second Quarter
1 unit, not given this year

AMELANG 133C. The African Forum, Third Quarter
1 unit, not given this year

AMELANG 134A. Beginning Igbo, First Quarter
3 units, Aut (Ajaelo, G)

AMELANG 134B. Beginning Igbo, Second Quarter
3 units, Win (Ajaelo, G)

AMELANG 134C. Beginning Igbo, Third Quarter
3 units, Spr (Ajaelo, G)

AMELANG 135A. Intermediate Igbo, First Quarter
3 units, Aut (Ajaelo, G)

AMELANG 135B. Intermediate Igbo, Second Quarter
3 units, Win (Ajaelo, G)

AMELANG 135C. Intermediate Igbo, Third Quarter
3 units, Spr (Ajaelo, G)

AMELANG 136A. Beginning Xhosa, First Quarter
3 units, Aut (Sibanda, G)

AMELANG 136B. Beginning Xhosa, Second Quarter
3 units, Win (Sibanda, G)

AMELANG 136C. Beginning Xhosa, Third Quarter
3 units, Spr (Sibanda, G)

AMELANG 137C. Intermediate Xhosa, Third Quarter
3 units, Spr (Sibanda, G)

AMELANG 138A. Advanced Xhosa, First Quarter
3 units, Aut (Staff)

AMELANG 138B. Advanced Xhosa, Second Quarter
3 units, Win (Sibanda, G)

AMELANG 138C. Advanced Xhosa, Third Quarter
3 units, Spr (Sibanda, G)

AMELANG 140A. Beginning Yiddish, First Quarter
Reading, writing, and speaking.
4 units, Aut (Levitow, J)

AMELANG 140B. Beginning Yiddish, Second Quarter
Reading, writing, and speaking.
2-4 units, Win (Levitow, J)

AMELANG 140C. Beginning Yiddish, Third Quarter
Reading, writing, and speaking.
4 units, Spr (Levitow, J)

AMELANG 143A. Advanced Arabic Conversation, First Quarter
Repeatable once for credit. Prerequisite: second-year year Arabic or consent of instructor.
2 units, not given this year

AMELANG 143B. Advanced Arabic Conversation, Second Quarter
Repeatable once for credit. Prerequisite: second-year year Arabic or consent of instructor.
2 units, Win (Staff)

AMELANG 143C. Advanced Arabic Conversation, Third Quarter
2-3 units, not given this year

AMELANG 144A. Beginning Persian, First Quarter
3 units, Aut (Fahimi, S)

AMELANG 144B. Beginning Persian, Second Quarter
3 units, Win (Fahimi, S)

AMELANG 144C. Beginning Persian, Third Quarter
3 units, Spr (Fahimi, S)

AMELANG 147A. Beginning Bambara, First Quarter
3 units, not given this year

AMELANG 147B. Beginning Bambara, Second Quarter
3 units, not given this year

AMELANG 147C. Beginning Bambara, Third Quarter
3 units, not given this year

AMELANG 153A. Beginning Twi, First Quarter
3 units, Aut (Nyam, K)

AMELANG 153B. Beginning Twi, Second Quarter
3 units, not given this year

AMELANG 153C. Beginning Twi, Third Quarter
3 units, Spr (Staff)

AMELANG 156A. Beginning Zulu, First Quarter
3 units, Aut (Staff)

AMELANG 156B. Beginning Zulu, Second Quarter
3 units, Win (Sibanda, G)

AMELANG 156C. Beginning Zulu, Third Quarter
3 units, Aut (Sibanda, G)

AMELANG 157A. Intermediate Zulu, First Quarter
3 units, Aut (Sibanda, G), Win (Sibanda, G)

AMELANG 157B. Intermediate Zulu, Second Quarter
3 units, Spr (Sibanda, G)

AMELANG 157C. intermediate Zulu, Third Quarter
3 units, Spr (Sibanda, G)

AMELANG 158A. Advanced Zulu, First Quarter
3 units, Aut (Sibanda, G), Spr (Sibanda, G)

AMELANG 158B. Advanced Zulu, Second Quarter
3 units, Win (Sibanda, G)

AMELANG 158C. Advanced Zulu, Third Quarter
3 units, Spr (Sibanda, G)

AMELANG 161. The Contemporary Arab World and Culture through Literature
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. No knowledge of Arabic required; extra unit for readings in Arabic. Limited enrollment. GER:DB-Hum, EC-GlobalCom
4 units, Aut (Barhoum, K)

AMELANG 162. Arab Women Writers and Issues
Fiction and non-fiction work. The major cultural factors shaping their feminist attitudes. Readings: Fatima Mernissi, Nawal El-Saadawi, Etel Adnan, Fadia Faqir, Alifa Rifaat, and Sahar Khalifeh. No knowledge of Arabic required; extra unit for readings in Arabic. Limited enrollment. GER:DB-Hum, EC-Gender
4 units, Win (Barhoum, K)

AMELANG 163. The Arab World through Travel Literature
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*. No knowledge of Arabic required. Limited enrollment. GER:DB-Hum, EC-GlobalCom
4 units, not given this year

AMELANG 165. The West through Arab Eyes
Advanced Hindi. First Quarter GER:EC-GlobalCom
4 units, Spr (Staff)

AMELANG 170A. Biblical Hebrew
The basic lexicon and grammar of Hebrew of the *Tanakh* or Old Testament.
2-4 units, Win (Porat, G)

AMELANG 170B. Biblical Hebrew
The basic lexicon and grammar of Hebrew of the *Tanakh* or Old Testament.
1-4 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 173. Politics and Poetics in Israeli Literature: Amos Oz and Other Contemporary Hebrew Writers
Offered in conjunction with Amos Oz's visit as Stanford's Writer in Residence. Literature and political essays by Oz and contemporary Hebrew authors who address the Israeli-Palestinian conflict. Approaches that deal with the intersection of theory and practice and politics and poetics in Israeli literature. No knowledge of Hebrew required. GER:EC-GlobalCom
4-5 units, Aut (Shemtov, V)

AMELANG 176. Introduction to Ladino: Language, Literature, and Culture
Prerequisite: two quarters of Spanish.
1-4 units, Aut (Staff)

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.
4-5 units, Spr (Barhoum, K; Shemtov, V)

AMELANG 181B. Beginning Pulaar, Second Quarter
3 units, Win (Staff)

AMELANG 181C. Beginning Pulaar, Third Quarter
3 units, Spr (Staff)

AMELANG 184A. Beginning Turkish, First Quarter
3 units, Aut (Ozisik, N)

AMELANG 184B. Beginning Turkish, Second Quarter
3 units, Win (Ozisik, N)

AMELANG 184C. Beginning Turkish, Third Quarter
3 units, Spr (Ozisik, N)

AMELANG 185A. Intermediate Turkish, First Quarter
3 units, Aut (Ozisik, N)

AMELANG 185B. Intermediate Turkish, Second Quarter
3 units, Win (Ozisik, N)

AMELANG 185C. Intermediate Turkish, Third Quarter
3 units, Spr (Ozisik, N)

AMELANG 195A. Readings in Arabic Literature, First Quarter
Short stories, poetry, literary criticism, Islamic texts, essays, and prose by notable Arab writers. Readings in Arabic. Prerequisite: two years of Arabic, native speaker, or equivalent.
2-4 units, not given this year

AMELANG 196A. Reading Arabic, First Quarter
For seniors and graduate students who need to acquire reading ability in Arabic for the Ph.D. of for advanced research in their own field.
2-3 units, not given this year

AMELANG 196B. Reading Arabic, Second Quarter
For seniors and graduate students who need to acquire reading ability in Arabic for the Ph.D. of for advanced research in their own field.
2-3 units, not given this year

AMELANG 196C. Reading Arabic, Third Quarter
For seniors and graduate students who need to acquire reading ability in Arabic for the Ph.D. of for advanced research in their own field.
2-3 units, not given this year

AMELANG 198A. Colloquial Arabic, First Quarter
Sources include authentic conversations with native speakers, videotaped conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: 2 years of Arabic.
2-4 units, Win (Barhoum, K)

AMELANG 198B. Colloquial Arabic, Second Quarter
Sources include authentic conversations with native speakers, videotaped 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 198C. Colloquial Arabic, Third Quarter
Sources include authentic conversations with native speakers, videotaped 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 199A. Media Arabic, First Quarter
Arabic language used today in the printed and electronic media, including the Internet. Recurrent vocabulary and structures used in different modes of media coverage. Prerequisite: 2 years of Arabic.
2-4 units, Spr (Barhoum, K)

AMELANG 199B. Media Arabic, Second Quarter
Arabic language used today in the printed and electronic media, including the Internet. Recurrent vocabulary and structures used in different modes of media coverage. Prerequisite: 2 years of Arabic.
2-4 units, not given this year

AMELANG 199C. Media Arabic, Third Quarter
Arabic language used today in the printed and electronic media, including the Internet. Recurrent vocabulary and structures used in different modes of media coverage. Prerequisite: 2 years of Arabic.
2-4 units, not given this year

AMELANG 213A. Beginning Arabic: From Basic Script to Islamic Text, First Quarter
Introduction to Islam through Arabic. Islam as faith, practice, philosophy, and institution; personalities and dynasties
4 units, Aut (Aweiss, S)

AMELANG 213B. Beginning Arabic: From Basic Script to Islamic Text, Second Quarter
Introduction to Islam through Arabic. Islam as faith, practice, philosophy, and institution; personalities and dynasties
4 units, Win (Aweiss, S)

AMELANG 213C. Beginning Arabic: From Basic Script to Islamic Text, Third Quarter
Introduction to Islam through Arabic. Islam as faith, practice, philosophy, and institution; personalities and dynasties
4 units, Spr (Staff)

GRADUATE COURSES IN AFRICAN AND MIDDLE EASTERN LANGUAGES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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

For information on undergraduate and graduate programs in African Studies, see the "African Studies" section of this bulletin.

UNDERGRADUATE COURSES IN AFRICAN STUDIES

AFRICAST 107. Community Reconstruction and Development in Post- Apartheid South Africa
(Same as AFRICAST 207.) Seminar. The theory and practice of community reconstruction and development. Focus is on the Western Cape region. How S. African communities seek to redress economic injustice and stagnation in partnership with nongovernmental organizations, metropolitan government agencies, and higher education institutions. Innovative processes of community development and problem solving across sectors of the economy, neighborhoods, and demographic groups. National, regional and local policies, and community contexts which support or inhibit such processes.
5 units, Aut (Stanton, T)

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
5 units, Spr (Samoff, J)

AFRICAST 112. AIDS, Literacy, and Land: International Aid and the Problems of 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.
5 units, Win (Samoff, J)

AFRICAST 148. Media, Art, and Social Change in Africa
(Same as AFRICAST 248.) How does art both construct and intervene in social movements? What is the contested place of the media and arts in contemporary African identity formation? Given sub-Saharan Africa's place in the global economy, how does the consumption and circulation of global art and media offer key insights into debates about the political economy of globalization? Case studies include youth movements and artistic production, and the humanitarian intervention in the HIV/AIDS pandemic. GER:EC-GlobalCom
5 units, Spr (Hubbard, L)

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 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)

AFRICAST 212. AIDS, Literacy, and Land: International Aid and the Problems of 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)

GRADUATE COURSES IN AFRICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

AFRICAST 207. Community Reconstruction and Development in Post- Apartheid South Africa
(Same as AFRICAST 107.) Seminar. The theory and practice of community reconstruction and development. Focus is on the Western Cape region. How S. African communities seek to redress economic injustice and stagnation in partnership with nongovernmental organizations, metropolitan government agencies, and higher education institutions. Innovative processes of community development and problem solving across sectors of the economy, neighborhoods, and demographic groups. National, regional and local policies, and community contexts which support or inhibit such processes.
5 units, Aut (Stanton, T)

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 248. Media, Art, and Social Change in Africa
(Same as AFRICAST 148.) How does art both construct and intervene in social movements? What is the contested place of the media and arts in contemporary African identity formation? Given sub-Saharan Africa's place in the global economy, how does the consumption and circulation of global art and media offer key insights into debates about the political economy of globalization?

Case studies include youth movements and artistic production, and the humanitarian intervention in the HIV/AIDS pandemic.
5 units, Spr (Hubbard, L)

AFRICAST 299. Independent Study or Directed Reading
1 unit, Aut (Staff), Win (Staff), 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 (Rapp-Hanretta, K), Win (Rapp-Hanretta, K), Spr (Rapp-Hanretta, K)

AFRICAST 301. Dynamics of Change in Africa
For graduate students and advanced undergraduates. The transformed African policy landscape, including the African Union, truth and reconciliation commissions, poverty reduction strategy papers, HIV and AIDS, debt burdens, open and private universities, war crimes tribunals, multinational peacekeeping forces, democratization, and decentralization. Methods, alternative voices, and case studies.
5 units, not given this year

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 (Weinstein, J)

OVERSEAS STUDIES COURSES IN AFRICAN STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

MADRID AFRICAN STUDIES COURSES

OSPMADRD 24. Spain and Africa through the Ages
3 units, Spr (Surwillo, L)

PARIS AFRICAN STUDIES COURSES

OSPPARIS 186F. Contemporary African Literature in French
4 units, Win (Guyot, S)

AMERICAN STUDIES (AMSTUD) COURSES

For information on undergraduate programs in the American Studies Program, see the "American Studies" section of this bulletin.

UNDERGRADUATE COURSES IN AMERICAN STUDIES

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, Win (Mesa, C)

AMSTUD 105. From Blues to Rap: Representing Music in African American Literature
The significance of music to African American literature and culture. Writers include James Baldwin, August Wilson, and Ralph Ellison. Texts include novels, short stories, plays, essays, musical and video clips, and online resources. Issues include assimilation, authenticity, the African American aesthetic, and music as protest. GER:EC-AmerCul
5 units, Win (Braggs, R)

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 137. Jefferson in Paris
Thomas Jefferson's years in Paris (1784-1789). The historical, political, literary, aesthetic, domestic, romantic, and transformative aspects of the Paris sojourn, through an interdisciplinary approach to the facts and fictions Jefferson generated. Sources include letters, articles, books, histories, novels, and films.
3-5 units, Spr (Mesa, C)

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, Win (Jones, G)

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)

AMSTUD 179. Introduction to American Law
(Same as 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. GER:DB-SocSci
3-5 units, Aut (Friedman, L)

AMSTUD 183. Border Crossings and American Identities
(Same as ANTHRO 146A.) 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 184. Cityscapes of the Imaginary: The Urban World in Literature and Film
Experiences of the modernizing urban world through narratives of novelists, poets, and filmmakers who have charted the interior spaces of life in the city from historical, cultural, geographical, or transnational perspectives. Texts include: Zola's account of capitalist expansion in *Second Empire Paris, The Delights of Ladies;* Edward Said's diasporic Palestinian Cairo memoir, *Out of Place;* Sinan Anton's anti-imperialist poetry of Baghdad; Edwidge Danticat's Haitian New York and Port-au-Prince bicultural novel, *The Dew Breaker;* Pakistani British filmmaker Hanif Kureishi's vision of immigrant dislocation, *My Son the Fanatic;* and stories of Baltimore streets from the HBO series, *Wire*.
5 units, Spr (Duffey, C)

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 195. Individual Work

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

AMSTUD 202. The History of American Families
The cultural, regional, and class diversity of family life in America from colonial times to present. Native American families encountered by English settlers, the Puritan family of colonial New England, and African American families in slavery and freedom. Diversity of family structures and traditions of immigrant groups to the U.S. in the 19th century from Asia, Mexico, and northern, southern and eastern Europe. Change in response to industrialization and urbanization in American life, including how diverse families approach work, gender roles, childrearing, sexuality, marriage and divorce. Frontiers of new reproductive technology and gay marriage in light of these histories.

5 units, Spr (Horn, M)

AMSTUD 203A. Children in American History
Children as a subject of historical inquiry. The experience of children, ideas about childhood, and policies and institutions for children from the late 18th century to the present. How were children perceived and cared for within families, and what was growing up like for children? Variations in childhood experience based on class, race, ethnicity, gender, and geographic location. Discourses on the nature of childhood developed by experts and society. How society defined its responsibility to children, and how it treated those dependent on public care or defined as social problems. GER:DB-SocSci

5 units, Win (Horn, M)

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 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)

ANESTHESIA (ANES) COURSES

Only Stanford Introductory Seminars open to undergraduates are listed. See http://medcatalog.stanford.edu/ for additional offerings.

UNDERGRADUATE COURSES IN ANESTHESIA

ANES 70Q. The Psychosocial and Economic Ramifications of Critical Illness
Stanford Introductory Seminar. Preference to sophomores. The impact of critical illness on a patient and family members; difficulties involved in the decision making process for the patient, family, and healthcare professionals. Topics include: conventional views of death and dying, epidemiology of critical illness, grief, coping skills, cultural variations, euthanasia and withdrawal of care, palliative care and hospice, advanced directive and legal aspects of medical catastrophe, psychosocial dynamics of family meetings, and emotional ramifications of medical decisions.

3 units, Spr (Lin, L)

ANTHROPOLOGY (ANTHRO) COURSES

For information on undergraduate and graduate programs in the Department of Anthropology see the "Anthropology" section of this bulletin.

UNDERGRADUATE COURSES IN ANTHROPOLOGY

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 (Kapur, C)

ANTHRO 3. Introduction to Prehistoric Archaeology
(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, BIO 106, 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, Win (Klein, R)

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

4 units, Spr (DeGusta, D)

ANTHRO 8N. The Anthropology of Globalization
Stanford Introductory Seminar. Preference to freshmen. Anthropological approach to how cultural change, economic restructuring, and political mobilization are bound up together in the process of globalization. GER:DB-SocSci

3-4 units, Aut (Ebron, P)

ANTHRO 13. Bioarchaeology
The study of skeletal remains from archaeological contexts. Methods of bioarchaeology including taphonomy, paleodemographics, paleopathology, and molecular approaches. Case studies illustrate issues such as health consequences of the adoption of agriculture, cannibalism, and relationships among health, violence, class, and sex in historic and prehistoric cultures. GER:DB-NatSci

3-5 units, not given this year

ANTHRO 14. Introduction to Anthropological Genetics
(Same as HUMBIO 14.) How genetic methods address anthropological questions. Examples include the evolutionary relationships between humans and the apes, the place of the Neanderthals in human evolution, the peopling of the New World, ancient DNA, the genetics of ethnicity, forensic genetics, genomics, behavioral genetics, and hereditary diseases. GER:DB-NatSci
3-5 units, not given this year

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, not given this year

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, Spr (Wilcox, M)

ANTHRO 16N. 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 18N. Glimpses of Divinity
Stanford Introductory Seminar. Preference to freshmen. How human beings search for and identify the presence of the divine in everyday human life.Sources include spiritual classics in the Christian, Jewish and Hindu traditions including works by Augustine, Teresa of Avila, Jonathan Edwards, the Bhagvad Gita, the Zohar, and some ethnographies of non-literate traditions.
3 units, Win (Luhrmann, T)

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, Aut (Truncer, J)

ANTHRO 22N. Maya Hieroglyphic Writing
Stanford Introductory Seminar. Preference to freshmen. Decipherment of classic Maya writing. Principles of archaeological decipherment. Maya calendrical, astronomical, historical, mythological, and political texts on stone, wood, bone, shell, murals, ceramics, and books (screenfold codices). Archaeology and ethnohistory of Maya scribal practice and literacy. Related Mesoamerican writing systems. The evolution of writing and the relevance of writing to theories of culture and civilization. GER:DB-SocSci, EC-GlobalCom
4 units, Spr (Fox, J)

ANTHRO 28. Indigenous Australia
The prehistory and ethnology of New Guinea and Australia. Regional climate, environment, and pre-European history. Ethnography of the contact period focusing on theoretical problems central to the development of anthropological theory. Contemporary sociopolitical issues. Films. GER:DB-SocSci
4 units, Win (Bird, D)

ANTHRO 71. Linguistic Field Methods
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.
4-5 units, Spr (Fox, J)

ANTHRO 74A. Public Culture: Anthropological Approaches to Media and Popular Culture
How to think about media through its producers, audiences, and unexpected uses. Reception studies and the idea of a public as a self-aware audience or crowd. Social and textual analyses of popular culture.
3-5 units, Spr (Ahmad, T)

ANTHRO 77. Japanese Society and Culture
(Same as ANTHRO 277A.) 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
4-5 units, Win (Kohrman, M)

ANTHRO 88. 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, Win (Yanagisako, 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. WIM
5 units, Win (Aldrich, C)

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, WIM
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
3-5 units, Win (Bird, R)

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, WIM
5 units, Aut (Burce, A)

ANTHRO 91A. Archaeological Methods
(Same as ARCHLGY 102.) Methodological issues related to the investigation of archaeological sites and objects. Aims and techniques of archaeologists including: location and excavation of sites; dating of places and objects; analysis of artifacts and technology and the study of ancient people, plants, and animals. How these methods are employed to answer the discipline's larger research questions.
5 units, Spr (Hodder, I)

ANTHRO 91B. Method and Evidence in Sociocultural Anthropology
Characteristic ways of collecting evidence and supporting arguments in sociocultural anthropology. How to evaluate ethnographic claims. Research activities such as interviewing, participant observation, tracking extended cases, inspecting archives, and reading popular culture.
5 units, Win (Ferguson, J)

ANTHRO 91C. Anthropological Methods in Ecology, Environment, Evolution
The methodological and practical aspects of conducting anthropological investigation into human-environmental interactions. Tools for developing, asking, and evaluating anthropological questions in a systematic way. What can constitute an important question, how to frame a question that facilitates investigation, how to design a research project to begin investigating a question, hypothesis development, and experimental design. Approaches to ethnographic, behavioral, and ecological data collection, sampling strategies, observational methods, recording techniques and presentation style.
5 units, Spr (Bird, D)

ANTHRO 92. 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.
1-3 units, Aut (Beliso-DeJesus, A), Win (Beliso-DeJesus, A)

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.
5 units, Spr (Staff)

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 (Ahmad, T)

ANTHRO 95A. 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.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 98. Museum Method
Individually directed work on anthropology collections. Introduction to the computerized storage and retrieval system, cataloging, exhibit techniques. May be taken for one or two quarters by arrangement with instructor.
1-4 units, Aut (Staff), Spr (Staff), Sum (Staff)

ANTHRO 98B. Digital Methods in Archaeology
(Same as ANTHRO 298B.) Hands-on. Topics include: data capture, digital survey, and mapping instruments; GPS; digital video and photography; 3-D scanning; data analysis; CAD; GIS; panoramic virtual reality; and photogrammetry. GER:DB-EngrAppSci
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, EC-GlobalCom
3 units, Win (Truncer)

ANTHRO 100C. Chavín 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 (Contreras, D)

ANTHRO 103. The Archaeology of Modern Urbanism
(Same as ANTHRO 203.) 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 103A. Past Human Environments
(Same as ANTHRO 203A, ARCHLGY 101B, ARCHLGY 301B.) Perspectives, methods, and data that archaeology brings to human/environment interaction issues such as environmental variability and change, sustainability, and human impacts. How to use paleoenvironmental data in archaeological research; how to recover and analyze such data to reconstruct human/environment interactions in prehistory.
3-5 units, Spr (Contreras, D)

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 105A. Indigenous Peoples of South America and the Politics of Ethnicity
(Same as ANTHRO 205A.) Recent developments showing a growing empowerment of Indigenous peoples and increased participation in the construction of democratic processes. Challenges to traditional state institutions; new worldviews based on cultural identity and ethnicity. Recent debates about special rights regarding territoriality and natural resources and other claims formulated by

indigenous organizations to improve governance and implement a new type of citizen based on self-determination and the reorganization of the actual nation states.

3-5 units, Spr (Karp-Toledo, E)

ANTHRO 107A. Ethnohistory in the Andean World: Inca State, Rebellions, and Resistance

(Same as ANTHRO 207A.) The formation and expansion of the Inca state as a large multiethnic confederation, interrupted by the arrival of the Spaniards. Negotiations and adaptations during the colonial period; the proliferation of survival strategies allowing indigenous peoples to maintain their social organization; indigenous rebellions to recuperate land, local spiritual values, and central government. Emphasis is on the indigenous perspective. Ethnographic and ethnohistoric documents and findings that reflect events and thoughts from the conquest to the 20th century.

3-5 units, Win (Karp-Toledo, E)

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 111A. Cultural Heritage in Post-Socialist Europe

(Same as ARCHLGY 111.) How the fall of the Berlin wall transformed everyday life culturally, politically, and economically through transitions to capitalism and democracy. Interdisciplinary writing in anthropology, archaeology, urban studies, cultural studies, and media commentary on cultural heritage, memory and identity in the post-socialist Europe. How intervention into these spaces by contemporary artists and architects offers alternatives to think about the past?

3 units, Spr (Bezic, A)

ANTHRO 113. Fanual 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. Prerequisites: 3 or 6 or other instructor-approved archaeology course work. GER:DB-SocSci

5 units, Spr (Rick, J; Robertson, I)

ANTHRO 115A. Long-Term Human Interaction with Environment

(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, Spr (Truncer, J)

ANTHRO 116A. Magic, Science, and Religion: Archaeological Perspectives

(Same as ANTHRO 216A, ARCHLGY 110, ARCHLGY 310.) How human beings make sense of their worlds. The naturalness of ideas, human relations to the natural and supernatural, and dichotomies of West and other, sacred and secular, and faith and skepticism. The material-historical constitution of different of modes of thought. Sources include classic and contemporary theoretical readings in archaeology, anthropology and science studies. Archaeological and ethnographic case studies from different world regions and historical periods.

4-5 units, Aut (Aldrich, C)

ANTHRO 120. Introduction to Language Change

(Same as LINGUIST 160.) 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, Aut (Fox, J)

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 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 (Inoue, M)

ANTHRO 126A. Post-Socialist City

Anthropological approach to the investigation of cities in post-socialist societies. How the cities designed and built by socialist urban planners have changed since the 90s. City planning and architecture, politics of public space, and urban sociality. How the cities have been planned; how people inhabit and change cities in their daily lives.

5 units, Win (Staff)

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. Anthropology of Sound, Identity, and Place

(Same as MUSIC 152.) The ethnography of sound; challenges and opportunities in representing and interpreting the music, noise, and silence of human cultures. Readings include work that avoids, engages with, distorts, and celebrates sound. Goal is for the students to develop critical theories and techniques. Guest lecturer is MacArthur Fellow Steven Feld. Fieldwork includes making recordings; final project.

5 units, Win (Diehl, K)

ANTHRO 128A. Undesired Bodies: Labor Migration, the Nation State, and Globalization

Interdisciplinary. What an anthropological approach demonstrates about labor migration and its impact on migrant workers, the nation state, and globalization processes. Issues of globalization, economics, nationalism, statehood, bureaucracy, class, and race.

3-5 units, Aut (Korczyn, O)

ANTHRO 129. The Anthropology of Production and Consumption

Recent studies by anthropologists and scholars in related disciplines on global production chains and consumption practices. Theories and methods for integrating analysis of the cultural processes that shape the transnational production of commodities with analysis of

the cultural practices that shape their consumption. Transnational production, distribution, and consumption of commodities. Sources include literature on the cultural production of commodities and their consumption. Prerequisite: course work in cultural anthropology. Recommended: ANTHRO 90.

4-5 units, Spr (Yanagisako, S)

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.

4 units, Win (Engel, C)

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.

3-5 units, Aut (Meskell, L)

ANTHRO 135H. CSRE House Seminar: Race and Ethnicity at Stanford

Not open to freshmen. Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.

3-6 units, Aut (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, Win (Malkki, L)

ANTHRO 143A. Coming of Age; Youth, Power, and Public Culture in the Middle East

The lived experiences of Middle Eastern youth. The role of everyday practices in the production of society, culture, and politics. Focus is on public spaces of collectivity and sociality such as shopping areas, checkpoints, border crossings, and streetscapes. The negotiation and exertion of power at different scales. Topics such as militarism, migration, labor, gender, and family.

3-5 units, Aut (Monroe, K)

ANTHRO 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)

ANTHRO 146A. 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)

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 (Meskell, L)

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 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 151. Women, Fertility, and Work

(Same as ANTHRO 251.) Is gender culturally or biologically determined or both? The arguments for sociobiological and cultural determinist explanations of the differences between women and men are compared, emphasizing their intersection in work. Case studies: hunter/gatherer, horticultural (Melanesian), southern Chinese, and Anglo American societies. (HEF I, IV; DA-A) GER:DB-SocSci, EC-Gender

5 units, given next year

ANTHRO 160. Paleoanthropology Seminar

(Same as ANTHRO 260.) Aspects of human evolution through primary literature and fossils. Topics vary to fit the interests of participants. May be repeated for credit. (HEF II; DA-B) GER:DB-NatSci

3-4 units, not given this year

ANTHRO 161A. Ecology, Nature, and Society: Principle in Human Ecology

(Same as ANTHRO 261A.) Interdisciplinary. The study of diversity and change in human societies, using frameworks including anthropology, evolutionary ecology, history, archaeology, and economics. Focus is on population dynamics, family organization, disease, economics, warfare, politics, and resource conservation.

4 units, Aut (Glover, S)

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)

ANTHRO 162C. Current Issues in Paleoanthropology

(Same as ANTHRO 262C, BIO 130.) Current issues in fossil, archaeological, and genetic evidence for human evolution. Topics chosen by participants. May be repeated for credit.

1 unit, Aut (DeGusta, D), Win (DeGusta, D), Spr (DeGusta, D)

ANTHRO 163D. Darwin's Legacy
(Same as HUMBIO 184.) New understandings that have followed on Darwinian principles; remaining frontiers of research; areas of controversy.His legacy in anthropology, biology, religion, medicine, psychology, philosophy, and literature. 3 units requires discussion section and term paper.

1-3 units, Aut (Durham, W; Boggs, C; Dirzo, R; Siegel, R)

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, Spr (Durham, W)

ANTHRO 166A. Indigenous Forest Management
(Same as ANTHRO 266A.) Seminar. History, techniques and impacts, institutions for forest management, challenges to maintain indigenous resource bases in a globalizing world, policy framework, and emerging conservation and development alternatives. (HEF IV) GER:DB-SocSci

5 units, Spr (Irvine, D)

ANTHRO 169. Communicating Science: Proposals, Talks, Articles
(Same as ANTHRO 269. Graduate students register for 269.) The principles and practice of effective communication in science. Grant proposals, conference presentations, and scientific journal articles. Focus is on writing and speaking skills in professional contexts. GER:DB-SocSci

4-5 units, Win (DeGusta, D)

ANTHRO 171. The Biology and Evolution of Language
(Same as 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

ANTHRO 175. Human Osteology
(Same as ANTHRO 275, HUMBIO 180.) The human skeleton. Focus is on identification of fragmentary human skeletal remains. Analytical methods include forensic techniques, archaeological analysis, paleopathology, and age/sex estimation. Students work independently in the laboratory with the skeletal collection. GER:DB-NatSci

5 units, Win (DeGusta, D)

ANTHRO 175B. Advanced Human Osteology
(Same as ANTHRO 275B.) Skeletal analytical methods such as paleopathology, taphonomy, osteometry, and functional and evolutionary morphology. Strategies for osteological research. Students conduct independent projects in their area of interest. GER:DB-NatSci

5 units, Spr (DeGusta, D)

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. (HEF III; DA-C) GER:DB-SocSci

3-5 units, not given this year

ANTHRO 178. 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

5 units, Spr (Jobin, M)

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, Win (Jain, S)

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, Aut (Jain, S)

ANTHRO 180A. Biological and Evolutionary Perspectives on Gender and Sexuality
(Same as ANTHRO 280A.) Human sexuality, gender, and reproductive behavior using evolutionary and crosscultural framework. Themes such as the potential biases scientists bring to the study of sexuality, how findings are portrayed by the popular media, and the implications biological findings should or should not have on how contemporary society approaches gender issues.

4 units, Win (Glover, S)

ANTHRO 181. Culture and Mental Illness
(Same as 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 units, Spr (Luhrmann, T)

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, Spr (Kohrman, M)

ANTHRO 183A. Bodies in Pain: Anthropological Perspectives on Suffering and Distress
How do people know of and about the pain of others? How do liberal traditions of what it means to be human inform ideas of pain and suffering? What are the ethical, political, medical and legal potentialities and limitations of the relationships among language, narrative, distress, and pain? Sources include anthropologically-informed modalities such as phenomenology, critical theories in medical anthropology, philosophical approaches to skepticism, and ethnographic engagements with suffering in everyday life.

3-5 units, Spr (Chua, J)

ANTHRO 184A. Family Matters: Gender, Reproduction, and Making Family
Kinship structure. The history of kinship studies. Recent interventions in the study of family. New forms of family making in America such as transnational adoption and assisted reproduction. Readings primarily anthropological, but include science studies, gender theory, queer theory, and critical race studies.

5 units, Win (Romain, T)

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, Win (Lee, S)

ANTHRO 186. Kinship and Gender in South Asia
(Same as ANTHRO 286.) Focus is on current research of guest lecturers. Topics this year include prehistoric impacts of El Niño, human sacrifice in prehispanic Peru, and mortuary archaeology on the north coast of Peru. Prerequisite: 142/242 or equivalent or consent of instructor.

1-3 units, not given this year

ANTHRO 191C. Anthropological Sciences Capstone Core Seminar
See 291 for description. Required of undergraduate majors who are not in the honors program. Must be taken in the senior year, or by petition in the junior year.

1-3 units, Aut (Staff)

ANTHRO 196B. Senior Honors Seminar
Techniques for interpreting data, organizing bibliographic material, writing, editing, and revising. Preparation of papers for conferences and publications in anthropology.

5 units, Aut (Staff)

ANTHRO 197. Internship in Anthropological Sciences
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

4-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 199. Senior and Master's Thesis Writing Workshop
(Same as ANTHRO 299.) Techniques of interpreting data, organizing bibliographic materials, writing, editing and revising. Preparation of papers for conferences and publications in anthropology. Seniors register for 199; master's students register for 299.

1-2 units, not given this year

ANTHRO 201X. Readings in Science, Technology, and Society
Anthropological approaches and contributions to the field.

5 units, not given this year

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 (Kapur, C)

ANTHRO 203. The Archaeology of Modern Urbanism
(Same as ANTHRO 103.) 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.

5 units, Spr (Voss, B)

ANTHRO 203A. Past Human Environments
(Same as ANTHRO 103A, ARCHLGY 101B, ARCHLGY 301B.) Perspectives, methods, and data that archaeology brings to human/environment interaction issues such as environmental variability and change, sustainability, and human impacts. How to use paleoenvironmental data in archaeological research; how to recover and analyze such data to reconstruct human/environment interactions in prehistory.

3-5 units, Spr (Contreras, D)

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 205A. Indigenous Peoples of South America and the Politics of Ethnicity
(Same as ANTHRO 105A.) Recent developments showing a growing empowerment of Indigenous peoples and increased participation in the construction of democratic processes. Challenges to traditional state institutions; new worldviews based on cultural identity and ethnicity. Recent debates about special rights regarding territoriality and natural resources and other claims formulated by indigenous organizations to improve governance and implement a new type of citizen based on self-determination and the reorganization of the actual nation states.

3-5 units, Spr (Karp-Toledo, E)

ANTHRO 206. Human Origins
(Same as ANTHRO 6, BIO 106, 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, Win (Klein, R)

ANTHRO 207A. Ethnohistory in the Andean World: Inca State, Rebellions, and Resistance
(Same as ANTHRO 107A.) The formation and expansion of the Inca state as a large multiethnic confederation, interrupted by the arrival of the Spaniards. Negotiations and adaptations during the colonial period; the proliferation of survival strategies allowing indigenous peoples to maintain their social organization; indigenous rebellions to recuperate land, local spiritual values, and central government. Emphasis is on the indigenous perspective. Ethnographic and ethnohistoric documents and findings that reflect events and thoughts from the conquest to the 20th century.

3-5 units, Win (Karp-Toledo, E)

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. (HEF IV; DA-A)

5 units, not given this year

ANTHRO 213. Fanual 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. Prerequisites: 3 or 6 or other instructor-approved archaeology course work.

5 units, Spr (Rick, J; Robertson, I)

ANTHRO 216A. Magic, Science, and Religion: Archaeological Perspectives
(Same as ANTHRO 116A, ARCHLGY 110, ARCHLGY 310.) How human beings make sense of their worlds. The naturalness of ideas, human relations to the natural and supernatural, and dichotomies of West and other, sacred and secular, and faith and skepticism. The material-historical constitution of different of modes of thought. Sources include classic and contemporary theoretical readings in archaeology, anthropology and science studies. Archaeological and ethnographic case studies from different world regions and historical periods.

4-5 units, Aut (Aldrich, C)

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 0interpretation of space and place.

4 units, Win (Engel, C)

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.

3-5 units, Aut (Meskell, L)

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, Win (Malkki, L)

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 (Meskell, L)

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 251. Women, Fertility, and Work
(Same as ANTHRO 151.) Is gender culturally or biologically determined or both? The arguments for sociobiological and cultural determinist explanations of the differences between women and men are compared, emphasizing their intersection in work. Case studies: hunter/gatherer, horticultural (Melanesian), southern Chinese, and Anglo American societies. (HEF I, IV; DA-A)

5 units, given next year

ANTHRO 260. Paleoanthropology Seminar
(Same as ANTHRO 160.) Aspects of human evolution through primary literature and fossils. Topics vary to fit the interests of participants. May be repeated for credit. (HEF II; DA-B)

3-4 units, not given this year

ANTHRO 261A. Ecology, Nature, and Society: Principle in Human Ecology
(Same as ANTHRO 161A.) Interdisciplinary. The study of diversity and change in human societies, using frameworks including anthropology, evolutionary ecology, history, archaeology, and economics. Focus is on population dynamics, family organization, disease, economics, warfare, politics, and resource conservation.

4 units, Aut (Glover, S)

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)

ANTHRO 262C. Current Issues in Paleoanthropology
(Same as ANTHRO 162C, BIO 130.) Current issues in fossil, archaeological, and genetic evidence for human evolution. Topics chosen by participants. May be repeated for credit.

1 unit, Aut (DeGusta, D), Win (DeGusta, D), Spr (DeGusta, D)

ANTHRO 266A. Indigenous Forest Management
(Same as ANTHRO 166A.) Seminar. History, techniques and impacts, institutions for forest management, challenges to maintain indigenous resource bases in a globalizing world, policy framework, and emerging conservation and development alternatives. (HEF IV)

5 units, Spr (Irvine, D)

ANTHRO 269. Communicating Science: Proposals, Talks, Articles
(Same as ANTHRO 169. Graduate students register for 269.) The principles and practice of effective communication in science. Grant proposals, conference presentations, and scientific journal articles. Focus is on writing and speaking skills in professional contexts.

4-5 units, Win (DeGusta, D)

ANTHRO 270. Advanced Topics in Medical Anthropology
Graduate seminar. Specialized topics in human health, illness, and healing from anthropological perspectives. Topics based upon faculty and graduate student research interests and current issues. Students present topical research and analyses from published sources; required journal-quality paper. The history, theories, and methods of research. Recommended: courses in medical anthropology. (HEF I, IV; DA-C)

3-5 units, not given this year

ANTHRO 271. The Biology and Evolution of Language
(Same as ANTHRO 171.) 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 275. Human Osteology
(Same as ANTHRO 175, HUMBIO 180.) The human skeleton. Focus is on identification of fragmentary human skeletal remains. Analytical methods include forensic techniques, archaeological analysis, paleopathology, and age/sex estimation. Students work independently in the laboratory with the skeletal collection.

5 units, Win (DeGusta, D)

ANTHRO 275B. Advanced Human Osteology
(Same as ANTHRO 175B.) Skeletal analytical methods such as paleopathology, taphonomy, osteometry, and functional and evolutionary morphology. Strategies for osteological research. Students conduct independent projects in their area of interest.

5 units, Spr (DeGusta, D)

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. (HEF III; DA-C)

3-5 units, not given this year

ANTHRO 277A. 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 280A. Biological and Evolutionary Perspectives on Gender and Sexuality
(Same as ANTHRO 180A.) Human sexuality, gender, and reproductive behavior using evolutionary and crosscultural framework. Themes such as the potential biases scientists bring to the study of sexuality, how findings are portrayed by the popular media, and the implications biological findings should or should not have on how contemporary society approaches gender issues.
4 units, Win (Glover, S)

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.
4-5 units, Win (Kohrman, M)

ANTHRO 286. Kinship and Gender in South Asia
(Same as ANTHRO 186.) Focus is on current research of guest lecturers. Topics this year include prehistoric impacts of El Niño, human sacrifice in prehispanic Peru, and mortuary archaeology on the north coast of Peru. Prerequisite: 142/242 or equivalent or consent of instructor.
1-3 units, not given this year

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. Prerequisite: graduate standing or consent of instructor. With consent of instructors of 190 and 290A, undergraduate majors may substitute 290A for 190. (HEF IV)
5 units, not given this year

ANTHRO 290B. 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 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.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 298B. Digital Methods in Archaeology
(Same as ANTHRO 98B.) Hands-on. Topics include: data capture, digital survey, and mapping instruments; GPS; digital video and photography; 3-D scanning; data analysis; CAD; GIS; panoramic virtual reality; and photogrammetry.
3-5 units, not given this year

ANTHRO 299. Senior and Master's Thesis Writing Workshop
(Same as ANTHRO 199.) Techniques of interpreting data, organizing bibliographic materials, writing, editing and revising. Preparation of papers for conferences and publications in anthropology. Seniors register for 199; master's students register for 299.
1-2 units, not given this year

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 CASA 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.
5 units, Win (Malkki, L)

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 (Yanagisako, S)

ANTHRO 304. Data Analysis in the Anthropological Sciences
Univariate, multivariate, and graphical methods used for analyzing quantitative data in anthropological research. Archaeological and paleobiological examples. Recommended: algebra.
5 units, Spr (Robertson, I)

ANTHRO 306. Anthropological Research Methods
Required of CASA Ph.D. students; open to all graduate students. Research methods and modes of evidence building in ethnographic research. Enrollment limited to 10.
5 units, Spr (Luhrmann, T)

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.
5 units, not given this year

ANTHRO 308. Proposal Writing Seminar
Required of second-year Ph.D. students in Cultural and Social Anthropology. 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: 212 or consent of instructor.
5 units, Spr (Inoue, M)

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, Win (Meskell, L; Ebron, P)

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.
5 units, Win (Luhrmann, T)

ANTHRO 311G. Introduction to Culture and Society Studies in Anthropology
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. Prerequisite: EE 214, 264, or 265.
5 units, Win (Staff), Spr (Staff)

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.
5 units, Win (Kohrman, M)

ANTHRO 326B. Conduct and Misconduct in Science
The structure of modern science through a study of ethics and misconduct in research. Case studies of alleged scientific misconduct; what constitutes ethical research practices; the meaning of authorship; the limits of grantsmanship; the place of science in society; and roles of advisers, students, and postdocs. Theoretical and practical aspects of these issues. Emphasis is on anthropology and biology.

3-5 units, not given this year

ANTHRO 328. Visual Culture
The politics of visuality, social imagination, and the ethics of visual production and consumption in the current moment.Sources include anthropology, art history, and philosophy

5 units, Spr (Malkki, L)

ANTHRO 331. The Anthropology of Technology
Iconic discipline-building works of the last three decades; readings that lay out and intervene in contemporary debates.

5 units, Aut (Jain, S)

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.

5 units, not given this year

ANTHRO 337A. Violence: The Sacred and Rights of the Dead
(Same as FRENGEN 367.) The politics of dead bodies as key issue in the humanities during recent decades that link scholars from various disciplines. Contemporary examples of reburial practices of indigenous people, exhumation of disappeared bodies in Latin America, exhibitions of human remains, representation of dead bodies in art, and recent developments in the funerary practices (LifeGem, Biopresence). Rene Girard's theory of the relationship between violence and the sacred.

3-5 units, Spr (Domanska, E)

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.

5 units, Win (Inoue, M)

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.

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.

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.

4-5 units, not given this year

ANTHRO 352. Foucault: The Question of Method
Foucault as methodological exemplar for historical and social research. 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.

5 units, not given this year

ANTHRO 361. Human Behavioral Ecology
(Same as HUMBIO 117.) 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 362. Conservation and Evolutionary Ecology
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.

3-5 units, Spr (Bird, D)

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, Aut (Durham, W)

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. Must be taken for 5 units; may be repeatedonce for 2 units.

2-5 units, Win (Bird, R)

ANTHRO 370. Advanced Theory and Method in Historical Archaeology
Current debates about theory and method.

5 units, Aut (Voss, B)

ANTHRO 374. Beginnings of Social Complexity
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, Spr (Rick, J)

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.

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 using related methodologies. Intersections and contradictions between these theorists' work; their use in anthropological practice. Issues of gender, sexuality, and ethnicity.

5 units, not given this year

ANTHRO 380A. Topics in the Anthropology of China and Taiwan

Topics vary. May be repeated for credit.

3-5 units, not given this year

ANTHRO 393. Internship

Prerequisite: consent of instructor.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 395. Introduction to Cultural and Social Anthropology: Faculty Research

Required of first-year CASA Ph.D. May be repeated for a total of 5 units of credit over three quarters.

1-2 units, Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 397A. Directed Individual Tutorial

Supervised study with an individual faculty member.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 397B. Dissertation Fieldwork

Supervised work for CASA Ph.D. students conducting pre-dissertation or dissertation field research with an individual faculty member.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 398. Teaching Apprenticeship

Supervised work for a teaching mentor participating in an undergraduate course; not the same as teaching assistantship.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ANTHRO 399. Master's Research Thesis

Supervised work for terminal and coterminal master's students writing the master's project in the final quarter of the degree program.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

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 (Yanagisako, S), Win (Yanagisako, S), Spr (Yanagisako, S)

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

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.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

ANTHRO 445. Anthropology Brown Bag Series

Current topics and trends in cultural and social anthropology, cultural archaeology, and archaeology.

1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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.

4-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

APPLIED PHYSICS (APPPHYS) COURSES

For information on graduate programs in the Department of Applied Physics see the "Applied Physics" section of this bulletin.

UNDERGRADUATE COURSES IN APPLIED PHYSICS

APPPHYS 68N. Lasers and Photons

Stanford Introductory Seminar. Preference to freshmen. The physics of lasers and their light. Computer applets and hands-on investigations. Historical development of ideas about light: electromagnetic waves; particles; special relativity; quantum theory; and the laser. Properties of laser light: wavelength and frequency; coherence; polarization; interference; diffraction; and linear and nonlinear optics. Lasers and applications from Schawlow and Townes to Linac Coherent Light Source. Prerequisites: high school physics and calculus. GER:DB-EngrAppSci

3 units, Aut (Bucksbaum, P)

APPPHYS 79N. Energy Choices 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, Win (Theriot, J; Fisher, D)

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. Principles of synchronous demodulation and applications of lock-in amplifiers. Combinatorial and synchronous digital circuits. Design using programmable logic. Analog/digital conversion. Microprocessors and real time programming. Current lab interface protocols. Techniques commonly used for lab measurements. Development of student lab projects during the last three weeks of 208. 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. 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. Principles of synchronous demodulation and applications of lock-in amplifiers. Combinatorial and synchronous digital circuits. Design using programmable logic. Analog/digital conversion. Microprocessors and real time programming. Current lab interface protocols. Techniques commonly used for lab measurements. Development of student lab projects during the last three weeks of 208. Limited enrollment. Prerequisites: undergraduate device and circuit exposure.

3 units, Spr (Fox, J), alternate years, not given next year

APPPHYS 214. Randomness in the Physical World
(Same as STATS 214.) Topics include: random numbers, and their generation and application; disordered systems, quenching, and annealing; percolation and fractal structures; universality, the renormalization group, and limit theorems; path integrals, partition functions, and Wiener measure; random matrices; and optical estimation. Prerequisite: introductory course in statistical mechanics or analysis.

3 units, Spr (Diaconis, P; Fisher, D; Holmes, S), alternate years, not given next 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, not given this year

APPPHYS 218. X-Ray and Neutron Scattering in the 21st Century
Interaction of x-rays and neutrons with matter. Modern sources of radiation: synchrotrons, x-ray free electron lasers, and spallation neutron sources. Scattering formulae. Determination of molecular, crystal, and magnetic structures, and their associated charge, lattice, and magnetic excitations. Applications from condensed matter physics, materials science, biophysics, medicine, and the arts. Examples include thermal and quantum phase transitions, excitations and competing phases in high-temperature superconductors, materials under extreme pressure, structure of nanoparticles, proteins and water, computer-aided tomography, and nondestructive testing of art objects.

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, Aut (Mabuchi, H)

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, Win (Yamamoto, Y), alternate years, not given next year

APPPHYS 227. Applications of Quantum Information
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 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 (Kivelson, S)

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
Applications based on superconductivity as a phase-coherent macroscopic quantum phenomena. Topics include the superconducting pair wave function, London and Ginzburg-Landau theories, their physical content, the Josephson effect and superconducting quantum interference devices, s- and d-wave superconductivity, the response of superconductors to currents, magnetic fields, and RF electromagnetic radiation.
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
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.) 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, alternate years, not given this 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, not given this year

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, not given this year

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, Aut (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, collective instabilities, and nonlinear effects. Topics of current research in accelerator physics.
3 units, Win (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, Win (Mabuchi, H)

APPPHYS 377. Literature of Condensed Matter Physics
Discoveries and experiments in condensed matter physics in the past 15 years. Topics: sliding charge density waves in layer compounds, the first pressure-induced Mott transition and organic superconductor, discovery of superfluid 3He, quasicrystals, the Sharvin effect, the quantum Hall effect, and reentrant superconductivity. Journal club format; student presentations.
3 units, Win (Beasley, M), alternate years, not given next 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, Win (Bucksbaum, P), alternate years, not given next year

APPPHYS 387. Quantum Optics and Measurements
Postulates in quantum mechanics and quantum optics: Heisenberg's uncertainty principle, von Newmann's projection hypothesis, quantum non-demolition measurements, quantum states of light, cavity quantum electrodynamics, nonlocality and quantum entanglement. Second quantization of bosonic and fermionic fields; Glauber, Fock, Dicke, and Bloch states, first- and second-order coherence, quantum interference. Reservoir theory of open systems: Markoff and Born approximations, density operator master, Fokker-Planck, quantum Langevin, stochastic differential equations, quantum Monte-Carlo wavefunction method.
3 units, alternate years, not given this year

APPPHYS 388. Mesoscopic Physics and Nanostructures
Optical properties of semiconductor nanostructures: interband and intraband optical transitions, excitons and polaritons, semiconductor Bloch equations, bosonization, exciton BEC, exciton laser. Transport properties in mesoscopic and atomic systems: electron optics versus photon optics, Landauer-Büttiker formula, noise in diffusive and dissipative transport, nonequilibrium Green's function, electron

entanglement, Coulomb blockade, single electronics, and spin dynamics in semiconductor quantum dots. Student presentations on assigned topics.

3 units, alternate years, not given this year

APPPHYS 390. Dissertation Research

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

APPPHYS 392. Topics in Molecular Biophysics

Concepts from statistical mechanics applied to contemporary molecular biology: allosteric transitions; protein folding; molecular recognition; actin polymers and gels; molecular motors; lipids and membrane proteins; ion channels. Some of the basic models used to quantitate fundamental biomolecular functions. Prerequisites: elementary statistical mechanics and chemical kinetics.

3 units, alternate years, not given this year

APPPHYS 470. Condensed Matter Seminar

Current research and literature; offered by faculty, students, and outside specialists. May be repeated for credit.

1 unit, Aut (Beasley, M), Win (Beasley, M), Spr (Beasley, M)

APPPHYS 473A. Condensed Matter Physics

Students undertake background study prior to each weekly seminar offered through 470 as an introduction to topics of contemporary interest in condensed matter physics, critique each seminar for success in oral communication, and present a one-hour seminar on a contemporary topic for critique by the class. May be repeated for credit. Corequisite: 470.

2 units, Aut (Beasley, M), Win (Beasley, M), Spr (Beasley, M)

APPPHYS 483. Optics and Electronics Seminar

Current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited speakers. May be repeated for credit.

1 unit, Aut (Mabuchi, H), Win (Byer, R), Spr (Harris, S)

ARCHAEOLOGY (ARCHLGY) COURSES

For information on undergraduate in the Archaeology Program, see the "Archaeology" section of this bulletin.

UNDERGRADUATE COURSES IN ARCHAEOLOGY

ARCHLGY 1. Introduction to Prehistoric Archaeology

(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 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 101B. Past Human Environments

(Same as ANTHRO 103A, ANTHRO 203A, ARCHLGY 301B.) Perspectives, methods, and data that archaeology brings to human/environment interaction issues such as environmental variability and change, sustainability, and human impacts. How to use paleoenvironmental data in archaeological research; how to recover and analyze such data to reconstruct human/environment interactions in prehistory.

3-5 units, Spr (Contreras, D)

ARCHLGY 102. Archaeological Methods

(Same as ANTHRO 91A.) Methodological issues related to the investigation of archaeological sites and objects. Aims and techniques of archaeologists including: location and excavation of sites; dating of places and objects; analysis of artifacts and technology and the study of ancient people, plants, and animals. How these methods are employed to answer the discipline's larger research questions.

5 units, Spr (Hodder, I)

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, Win (Aldrich, C)

ARCHLGY 103C. Visualizing Archaeological Knowledge In the Information Age

(Same as ARCHLGY 303C. Graduate students register for 303C.) Why should archaeologists be concerned with new media? The emergence of new media in the popular and technical realms; why archaeology has begun to use new media and how it can benefit; how representing and distributing archaeological information is being changed, and epistemological and ethical implications. Hands-on application of new media to an archaeological project using blogs, wikis, and 3-D immersive environments.

3-5 units, not given this year

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 105A. Cultural Property and Global Heritage

(Same as ARCHLGY 305A.) The historical, commercial, and intellectual contexts of the collection and misappropriation of cultural artifacts from the 18th century to the present; implications and what they reveal about human engagement with the material past. Emphasis is on contemporary legal and ethical issues of trade and repatriation.

3-5 units, Spr (Brodie, N)

ARCHLGY 106A. Museums and Collections

(Same as ARCHLGY 306A.) Global organization of museums; their history and roles in society. Social issues involved in the management of collections, and their public role. The role of the curator in contemporary society.

3-5 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 (Contreras, D)

ARCHLGY 108A. Archaeological Field Methods

Student participation in on-campus excavation at the site of the old gymnasium. Excavation skills, laboratory processing, and primary recording.

5 units, Spr (Staff)

ARCHLGY 109. Archaeogenetics

(Same as ARCHLGY 309.) The application of human genetic studies to the interpretation of archaeological data. Focus is on the transition to the Neolithic; attention to more recent case studies pertinent to historic anthropology. Topics include: the social construction of race and ethnicity; colonialist abuses of genetic theories and data; the Neolithic transition to agropastoralism in the Near East, Europe, and N.E. Africa; Greek and Phoenician colonies in the Mediterranean; the Bantu expansion; the Atlantic slave trade and the African diaspora; expansion of agriculture in E. Asia, and the peopling of Oceania and the Americas.

4-5 units, Aut (King, R)

ARCHLGY 110. Magic, Science, and Religion: Archaeological Perspectives

(Same as ANTHRO 116A, ANTHRO 216A, ARCHLGY 310.) How

human beings make sense of their worlds. The naturalness of ideas, human relations to the natural and supernatural, and dichotomies of West and other, sacred and secular, and faith and skepticism. The material-historical constitution of different of modes of thought. Sources include classic and contemporary theoretical readings in archaeology, anthropology and science studies. Archaeological and ethnographic case studies from different world regions and historical periods.

4-5 units, Aut (Aldrich, C)

ARCHLGY 111. Cultural Heritage in Post-Socialist Europe
(Same as ANTHRO 111A.) How the fall of the Berlin wall transformed everyday life culturally, politically, and economically through transitions to capitalism and democracy. Interdisciplinary writing in anthropology, archaeology, urban studies, cultural studies, and media commentary on cultural heritage, memory and identity in the post-socialist Europe. How intervention into these spaces by contemporary artists and architects offers alternatives to think about the past?

3 units, Spr (Bezic, A)

ARCHLGY 112. The Archaeology of Early Islam
(Same as ARCHLGY 312.) The material culture of the beginnings of Islam, including the Umayyads in the Levant, the Abbasids in Iraq, and the further provinces of the Caliphate. The transition from Byzantium to Islam and the mechanisms of cultural adaptation. The economic and cultural globalization of the 8th and 9th centuries.

3-5 units, Spr (Staff)

GRADUATE COURSES IN ARCHAEOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ARCHLGY 301B. Past Human Environments
(Same as ANTHRO 103A, ANTHRO 203A, ARCHLGY 101B.) Perspectives, methods, and data that archaeology brings to human/environment interaction issues such as environmental variability and change, sustainability, and human impacts. How to use paleoenvironmental data in archaeological research; how to recover and analyze such data to reconstruct human/environment interactions in prehistory.

3-5 units, Spr (Contreras, D)

ARCHLGY 303C. Visualizing Archaeological Knowledge In the Information Age
(Same as ARCHLGY 103C. Graduate students register for 303C.) Why should archaeologists be concerned with new media? The emergence of new media in the popular and technical realms; why archaeology has begun to use new media and how it can benefit; how representing and distributing archaeological information is being changed, and epistemological and ethical implications. Hands-on application of new media to an archaeological project using blogs, wikis, and 3-D immersive environments.

3-5 units, not given this year

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 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 305A. Cultural Property and Global Heritage
(Same as ARCHLGY 105A.) The historical, commercial, and intellectual contexts of the collection and misappropriation of cultural artifacts from the 18th century to the present; implications and what they reveal about human engagement with the material past. Emphasis is on contemporary legal and ethical issues of trade and repatriation.

3-5 units, Spr (Brodie, N)

ARCHLGY 306A. Museums and Collections
(Same as ARCHLGY 106A.) Global organization of museums; their history and roles in society. Social issues involved in the management of collections, and their public role. The role of the curator in contemporary society.

3-5 units, Spr (Newble, L)

ARCHLGY 309. Archaeogenetics
(Same as ARCHLGY 109.) The application of human genetic studies to the interpretation of archaeological data. Focus is on the transition to the Neolithic; attention to more recent case studies pertinent to historic anthropology. Topics include: the social construction of race and ethnicity; colonialist abuses of genetic theories and data; the Neolithic transition to agropastoralism in the Near East, Europe, and N.E. Africa; Greek and Phoenician colonies in the Mediterranean; the Bantu expansion; the Atlantic slave trade and the African diaspora; expansion of agriculture in E. Asia, and the peopling of Oceania and the Americas.

4-5 units, Aut (King, R)

ARCHLGY 310. Magic, Science, and Religion: Archaeological Perspectives
(Same as ANTHRO 116A, ANTHRO 216A, ARCHLGY 110.) How human beings make sense of their worlds. The naturalness of ideas, human relations to the natural and supernatural, and dichotomies of West and other, sacred and secular, and faith and skepticism. The material-historical constitution of different of modes of thought. Sources include classic and contemporary theoretical readings in archaeology, anthropology and science studies. Archaeological and ethnographic case studies from different world regions and historical periods.

4-5 units, Aut (Aldrich, C)

ARCHLGY 312. The Archaeology of Early Islam
(Same as ARCHLGY 112.) The material culture of the beginnings of Islam, including the Umayyads in the Levant, the Abbasids in Iraq, and the further provinces of the Caliphate. The transition from Byzantium to Islam and the mechanisms of cultural adaptation. The economic and cultural globalization of the 8th and 9th centuries.

3-5 units, Spr (Staff)

ART HISTORY (ARTHIST) COURSES

For information on undergraduate and graduate programs in Art History, see the "Art and Art History" section of this bulletin.

ART HISTORY COURSE CATALOG NUMBERING SYSTEM

The first digit of the ARTHIST course number indicates its general level of sophistication.

1- 99	Introductory
100-199	Undergraduate level
200-299	Undergraduate seminars/individual work
300-399	Graduate level
400-599	Graduate seminars/individual work

The numbers below indicate the area of Art History it addresses.

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

UNDERGRADUATE COURSES IN ART HISTORY

ARTHIST 1. Introduction to the Visual Arts
Multicultural rather than historical approach. GER:DB-Hum, WIM

5 units, Aut (Pentcheva, B)

ARTHIST 3. Introduction to the History of Architecture
Introduction to the History of Architecture'From antiquity to the 20th century, mostly Western with some non-Western topic.

Buildings and general principles relevant to the study of architecture. GER:DB-Hum 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. Introduction to museum administration; art registration, preparation, and installation; rights and reproductions of images; exhibition planning; and art storage, conservation, and security. Skill building in public speaking, inquiry methods, group dynamics, theme development, and art-related vocabulary. 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. Classical and 4th-Century Greek Art

(Same as ARTHIST 302, CLASSART 102.) The formation of the classical ideal in 5th-century Athenian art, and its transformation and diffusion in the 5th and 4th centuries against changing Greek history, politics, and religion. 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, Win (Pentcheva, B)

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, not given this year

ARTHIST 107. Age of Cathedrals

(Same as ARTHIST 307.) Gothic art and architecture in W. Europe, 1150-1500. The structuring of a modern visual discourse within the ideological framework of a new monarchical church and state, emerging towns and universities, the rise of literacy, the cultivation of self, and the consequent shifts in patterns of art patronage, practice, and reception in Chartres, Paris, Bourges, Strasbourg, Canterbury, London, Oxford, and Cambridge. GER:DB-Hum

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, Aut (Hansen, M)

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, not given this year

ARTHIST 116. European Baroque Sculpture

(Same as ARTHIST 316.) Characteristics of and innovations in sculpture in 17th-century Europe. The integration of sculpture with architecture in theatrical settings by Gian Lorenzo Bernini. Idealized images of statehood for mercantile republics, absolutist monarchs, and the papacy. Works for private contemplation, ideas of classical versus modern style, and workshop practices. GER:DB-Hum

4 units, not given this year

ARTHIST 117. Picturing the Papacy: Renaissance to Neoclassicism

(Same as ARTHIST 317.) Campaigns of renovations aimed at restoring Rome to its former legendary splendor. How artists and architects created spectacular, large-scale representations of and for Christ's vicars on earth following the return of the papacy from Avignon in the early 15th century; how they negotiated papal nepotistic intentions from the 15th to the 18th century. GER:DB-Hum

4 units, Spr (Hansen, M)

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, Spr (Marrinan, M)

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 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. 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. Additional weekly discussion for graduate students. Recommended: some prior experience with 19th-century art. GER:DB-Hum

4 units, Aut (Marrinan, M)

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 133. American Art in the Gilded Age
(Same as ARTHIST 333.) Interdisciplinary. Art, literature, patronage, and cultural institutions of the late 19th century. Aestheticism, conspicuous consumption, the grand tour, and the expatriate experience. The period's great collectors, taste makers, and artists: Thomas Eakins, Winslow Homer, Mary Cassatt, James Whistler, John Singer Sargent, Albert Pinkham Ryder, William Harnett, and John Peto. GER:DB-Hum

4 units, Aut (Marshall, J)

ARTHIST 141. The Invention of Modern Architecture
(Same as ARTHIST 341.) The creation and development of new architectural forms and theories, from the late 18th to the early 20th centuries, mainly in Europe but also in America. Emphasis is on the responses to new materials, technologies, and social conditions, and how they shaped the architecture of the present. Recommended as preparation for 142. GER:DB-Hum

4 units, not given this year

ARTHIST 142. Varieties of Modern Architecture
(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 149. Art Between the Wars: Dada, De Stijl, Constructivism, Surrealism
(Same as ARTHIST 349.) Historical avant garde movements and anti-modernist tendencies such as socialist realism and Nazi art. Issues: artistic responses to wartime trauma; attempts to develop the progressive potential of technology and the political utility of art; and attempts to reorder relations between body and machine, art object and commodity, and private and public life. Artists: Richter, Heartfield, Tzara, Rodchenko, Tatlin, Bellmer, Man Ray, and Ernst. Readings: the modern subject, mass culture, the modernism/anti-modernism debates of the 30s, and the uses of art in totalitarian regimes. GER:DB-Hum GER:DB-Hum

4 units, not given this year

ARTHIST 151. Transatlantic Modernism: Paris and New York in the Early 20th Century
(Same as ARTHIST 351.) Modernism in the American arts at home and abroad, emphasizing transatlantic expatriation, cultural politics, and creative alliances. Painters and sculptors are the focus. Literary figures who interacted with artists such as Gertrude Stein, William Carlos Williams, and Langston Hughes. Topics and artists: the Armory Show, Marcel Duchamp, Francis Picabia, Futurism, Fernand Léger, Alfred Stieglitz, Charles Demuth, Georgia O'Keefe, Gerald Murphy, the Harlem Renaissance, John Storrs, and Florine Stettheimer. GER:DB-Hum

4 units, not given this year

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, Aut (Lee, P)

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 159A. Photography in America
(Same as ARTHIST 359A.) The history of American photography as fine art and social tool. Topics include: defense of photography as a legitimate art form; role of portraits and photo albums in social self-fashioning; technological and market aspects of photography; politics of straight or documentary aesthetics; role of women; and how the idea of America has been shaped by photographs. Artists include Matthew Brady, Alfred Stieglitz, Edward Weston, Walker Evans, Dorothea Lange, Robert Frank, Garry Winogrand, William Eggleston, and Mary Ellen Mark. GER:DB-Hum GER:DB-Hum

4 units, not given this year

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.

4 units, Spr (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, Spr (Lee, P)

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 182A. Imperial Eyes: Court Arts of Ming Dynasty China
(Same as ARTHIST 382A.) Coincides with a major loan exhibition of Ming court arts at the Asian Art Museum of San Francisco. How Ming dynasty emperors, aristocrats, eunuchs and officials used art patronage to assert political power and cultural values. Major Chinese court art forms and media, including painting, porcelain, textiles, furniture, and metalwork. Topics include styles and modes of signification, artists' careers and artist-patron relationships, court institutions, and the impact of court arts on the wider world. Field trips to the exhibition at the Asian Art Museum. GER:DB-Hum

4 units, Sum (Vinograd, R)

ARTHIST 184. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting
(Same as ARTHIST 384.) The changes marking the transition from medieval to early modern Japanese society generated a revolution in visual culture. This paradigm shift 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

ARTHIST 185. Art in China's Modern Era
(Same as ARTHIST 385.) From the late Ming period to contemporary arts. Topics: urban arts and print culture; commodification of art; painting theories; self portrayals; court art, collection, and ideological programs; media and modernity in Shanghai; politics and art in the People's Republic; and contemporary avant garde and transnational movements. 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:EC-GlobalCom
4 units, Aut (Vinograd, R)

ARTHIST 187. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868
(Same as ARTHIST 387, JAPANGEN 87.) 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, Win (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.
4 units, Spr (Beischer, T)

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 193A. Caribbean and Latin American Art: Empire, Identity, and Society
(Same as ARTHIST 393A.) Visual culture from 1505 to 1889 and its relation to current debates on cultural identity, hybridity, syncretism, and creolization. Painting, travel books, and printmaking by artists including De Bry, Belisario, Rugendas, Debret, and Landaluce. Visual analysis of works at the Yale Center for the British Art and Stanford's Green Library. GER:DB-Hum
4 units, not given this year

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 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.
5 units, Aut (Maxmin, J)

ARTHIST 204A. Appropriations of Greek Art
(Same as CLASSART 110.) The history of the appropriation of Greek art by Rome, the Renaissance, Lord Elgin, and Manet.
5 units, not given this year

ARTHIST 207A. The Message of Light and Color: The Art of Mosaics in the Mediterranean
Why mosaics in early Christian and Medieval contexts were placed on apses, triumphal arches, and clerestories. Why early Christian artists used the technically difficult and costly medium of mosaicsl? Why and how images of God-Father and Christ were legitimized in spite of the second commandment prohibiting images. What sort of a message was involved considering the near invisibility of mosaics located high up in apses and clerestories.
5 units, Aut (Brenk, B)

ARTHIST 212. Renaissance Florence, 1440-1540
Notions of cultural superiority in light of changes in Florentine society as it went from being a republic to a duchy ruled by the Medici. Artists and architects such as Donatello, Brunelleschi, Botticelli, Michelangelo, and Pontormo praised as having revived the arts and returned them to a level of ancient splendor. The role of the sacred in daily life and uses of the pagan past for poetic and scholarly expressions and as vehicles for contemporary experience.
5 units, not given this year

ARTHIST 213. Print Culture: From Dürer to Goltzius
Coincides with the exhibition at the Cantor Arts Center. The relatively inexpensive and reproducible nature of prints, and how they became vehicles for spreading artistic inventions and political religious propaganda.
5 units, Win (Hansen, M)

ARTHIST 222. Chardin and Watteau: An Aesthetics of Touch
These 18th-century painters preferred everyday life subjects, still-lifes, and landscape; Watteau invented the fête galante as a new picture type. Common to their work is attention to the materials of art: surfaces, textures, and glazes of paint; graphic range of chalk, ink, and pencil; an objectness that signals the artist's creative presence. Readings in contemporary theory and historical criticism frame an aesthetics of touch at odds with the eye-centered bias of Academic theory. Student presentations. Recommended: 121. GER:DB-Hum
5 units, not given this year

ARTHIST 226. Georges Seurat
Art and cultural context of the inventor of pointillism, associated with scientific discoveries about the nature of light. Dimensions of Seurat's work that escape a purely scientific understanding; the psychological tenor of his imagery; his choice of subject matter; drawings that are neither colored nor dot-like in style; his interest in the traditions of art; and left-wing politics.
5 units, not given this year

ARTHIST 227. Gustave Courbet
His evolving historical persona over the past three decades, emphasizing recent critical writings. Recommended: reading knowledge of French.
5 units, Aut (Marrinan, M)

ARTHIST 232. Rethinking American Art
Painting and some sculpture of the 18th and 19th centuries, focusing on works in the de Young MuseumEmphasis is on recent scholarship, genre, and the biography of objects as they shift in context and meaning over time. Weekly meetings at the de Young with Professor Margaretta Lovell and UC Berkeley students.
5 units, not given this year

ARTHIST 233. The Art Museum: History and Practice
Workshop. Contemporary museum culture emphasizing the collecting and exhibiting practices of art museums. Readings, field trips, and discussions with museum professionals. Each student creates a detailed proposal for a museum exhibition and presents it to a panel of faculty and curators. GER:DB-Hum

5 units, not given this year

ARTHIST 234A. The Harlem Renaissance
African Americans artistic expression in the 20s that reflected changing conditions of urban modernity and racial identity. The forms and meanings of African American modernism; social politics of black self-representation and white patronage; and how high culture became the primary front in the struggle for racial uplift. Cultural figures include: Aaron Douglas, W.E.B. Du Bois, Marcus Garvey, Langston Hughes, Jacob Lawrence, Zora Neale Hurston, and Carl Van Vechten. Sources include painting, sculpture, music, and literature.

5 units, Aut (Marshall, J)

ARTHIST 235A. Art and the Machine Age
Artistic and intellectual responses to modernization. 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 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, Spr (Marrinan, M)

ARTHIST 245. Photographic Utopia Under Stalin
Photographic practices of foreign and Soviet travelers searching for the future in Russia and the Central Asian Republics during Stalin's crash industrialization and forced collectivization program of the 30s. Topics include utopia, propaganda, image-text relations. Protagonists include: photojournalists Lotte Jacobi, Margaret Bourke-White, Max Al'pert, Aleksandr Rodchenko, and Ella Maillart; photomonteur John Heartfield; documentary filmmaker Joris Ivens; writers Langston Hughes and Sergei Tret'iakov; and theorists Enzensberger, Benjamin, Barthes, and Derrida.

5 units, Spr (Gough, M)

ARTHIST 248. Futurisms
(Same as COMPLIT 238, ITALGEN 238.) From its foundation in 1909 through WW II, futurism developed into the first truly international cultural-political avant garde. Its aim was the revolutionary transformation of all spheres of life. The movement's manifestations in Italy, Russia, France, Spain, Latin America, and Eastern Europe. Topics: machines and culture; visual poetics and war; futurism's complex ties to bolshevism and fascism. Media: poetry, performance, music, painting, photography, radio, and film. Writers include: Marinetti, Mayakovsky. Visual artists include: Boccioni, Bragaglia, Russolo, Malevich, Lissitzky.

5 units, Win (Schnapp, J; Gough, M)

ARTHIST 252A. Place: Making Space Now
The difference between place and space. Traditional notions of place by scale such as home, city, and nation state. Challenges to traditional notions of place such as: being out of place; nomadic place; and how architects can design for non-places. Reconceptualizations of contemporary space such as the role of digital and cyber technologies; how locality is constructed in a global world; the sense of place in the in-between places created by a world in flux.

5 units, not given this year

ARTHIST 254. Utopia and Reality in Modern Urban Planning
(Same as URBANST 164.) Primarily for Urban Studies and Art majors. Utopian urbanist thinkers such as Ebenezer Howard, Le Corbusier, and Frank Lloyd Wright who established the conceptual groundwork of contemporary urban planning practice. Research paper. GER:DB-Hum

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, Spr (Staff)

ARTHIST 281A. Making Art History in Republican China
The construction of modern art historical discourses under a new national regime and within an international context; the role of public institutions and media such as museums, art academies, and art journals in forming a new public role for art and art collecting; and the cultural politics of art production.

5 units, not given this year

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, Aut (Vinograd, R)

ARTHIST 283A. Paris and Shanghai, 1880-1940: Mexdiating the City
Offered in conjunction with the Stanford Humanities Laboratory. Mediations of the cosmopolitan cities of Shanghai and Paris as frames and stages for representation and social presentation, including: conventional visual, pictorial, and art media such as painting, lithography, photography, and film; and complex, multimedia and social spaces such as illustrated periodicals, cabarets, theaters, shopping streets, and expositions. The materiality of media, social and economic systems, cultural spaces, and the construction of urban imaginaries.

5 units, not given this year

ARTHIST 284A. Art Discourses and Art Production in Late Ming China
The interplay of art theory, taste, and collecting with art production, especially painting from 1550-1664, in the context of regional and urban cultures.

5 units, not given this year

ARTHIST 286. Shini-e: The Performance of Death in Japanese Actor Prints
Memorial prints, *shini-e,* issued upon the death of celebrated kabuki actors to celebrate the actor's life and ask for patron support for his descendants. They often included the actor's own death poem. Intellectual issues include the performative self in traditional Japan, the afterlife, commercialism of the theatrical milieu, lineage, fandom, and death protocols. Sources include a loan collection of more than 400 *shini-e;* students give intellectual shape to this material and present it as an exhibit at the Cantor.

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
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, not given this year

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 296. Junior Seminar: The Practice of Art Criticism
Historiography and methodology.
5 units, Aut (Gough, M)

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. Classical and 4th-Century Greek Art
(Same as ARTHIST 102, CLASSART 102.) The formation of the classical ideal in 5th-century Athenian art, and its transformation and diffusion in the 5th and 4th centuries against changing Greek history, politics, and religion.
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, Win (Pentcheva, B)

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, not given this year

ARTHIST 307. Age of Cathedrals
(Same as ARTHIST 107.) Gothic art and architecture in W. Europe, 1150-1500. The structuring of a modern visual discourse within the ideological framework of a new monarchical church and state, emerging towns and universities, the rise of literacy, the cultivation of self, and the consequent shifts in patterns of art patronage, practice, and reception in Chartres, Paris, Bourges, Strasbourg, Canterbury, London, Oxford, and Cambridge.
4 units, not given this year

ARTHIST 308. Virginity and Power: Mary in the Middle Ages
(Same as ARTHIST 108.) The influential female figure in Christianity whose state cult was connected with the idea of empire. 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, 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, Aut (Hansen, M)

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, not given this year

ARTHIST 316. European Baroque Sculpture
(Same as ARTHIST 116.) Characteristics of and innovations in sculpture in 17th-century Europe. The integration of sculpture with architecture in theatrical settings by Gian Lorenzo Bernini. Idealized images of statehood for mercantile republics, absolutist monarchs, and the papacy. Smaller works for private contemplation, ideas of classical versus modern style, and workshop practices. GER:DB-Hum
4 units, not given this year

ARTHIST 317. Picturing the Papacy: Renaissance to Neoclassicism
(Same as ARTHIST 117.) Campaigns of renovations aimed at restoring Rome to its former legendary splendor. How artists and architects created spectacular, large-scale representations of and for Christ's vicars on earth following the return of the papacy from Avignon in the early 15th century; how they negotiated papal nepotistic intentions from the 15th to the 18th century.
4 units, Spr (Hansen, M)

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, Spr (Marrinan, M)

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, Aut (Marrinan, M)

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 333. American Art in the Gilded Age
(Same as ARTHIST 133.) Interdisciplinary. Art, literature, patronage, and cultural institutions of the late 19th century. Aestheticism, conspicuous consumption, the grand tour, and the expatriate experience. The period's great collectors, taste makers, and artists: Thomas Eakins, Winslow Homer, Mary Cassatt, James Whistler, John Singer Sargent, Albert Pinkham Ryder, William Harnett, and John Peto.

4 units, Aut (Marshall, J)

ARTHIST 341. The Invention of Modern Architecture
(Same as ARTHIST 141.) The creation and development of new architectural forms and theories, from the late 18th to the early 20th centuries, mainly in Europe but also in America. Emphasis is on the responses to new materials, technologies, and social conditions, and how they shaped the architecture of the present. Recommended as preparation for 142.

4 units, not given this year

ARTHIST 342. Varieties of Modern Architecture
(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 349. Art Between the Wars: Dada, De Stijl, Constructivism, Surrealism
(Same as ARTHIST 149.) Historical avant garde movements and anti-modernist tendencies such as socialist realism and Nazi art. Issues: artistic responses to wartime trauma; attempts to develop the progressive potential of technology and the political utility of art; and attempts to reorder relations between body and machine, art object and commodity, and private and public life. Artists: Richter, Heartfield, Tzara, Rodchenko, Tatlin, Bellmer, Man Ray, and Ernst. Readings: the modern subject, mass culture, the modernism/anti-modernism debates of the 30s, and the uses of art in totalitarian regimes. GER:DB-Hum

4 units, not given this year

ARTHIST 351. Transatlantic Modernism: Paris and New York in the Early 20th Century
(Same as ARTHIST 151.) Modernism in the American arts at home and abroad, emphasizing transatlantic expatriation, cultural politics, and creative alliances. Painters and sculptors are the focus. Literary figures who interacted with artists such as Gertrude Stein, William Carlos Williams, and Langston Hughes. Topics and artists: the Armory Show, Marcel Duchamp, Francis Picabia, Futurism, Fernand Léger, Alfred Stieglitz, Charles Demuth, Georgia O'Keefe, Gerald Murphy, the Harlem Renaissance, John Storrs, and Florine Stettheimer.

4 units, not given this year

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, Aut (Lee, P)

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 359A. Photography in America
(Same as ARTHIST 159APphotography as fine art and social tool. Photography as a legitimate art form; role of portraits and photo albums in social self-fashioning; technological and market aspects of photography; politics of straight or documentary aesthetics; role of women; and how the idea of America has been shaped by photographs. Artists include Matthew Brady, Alfred Stieglitz, Edward Weston, Walker Evans, Dorothea Lange, Robert Frank, Garry Winogrand, William Eggleston, and Mary Ellen Mark.

4 units, not given this year

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, Spr (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, Spr (Lee, P)

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. Innovations in architectural and ceramic technologies;

developments in landscape painting and theory; proliferation of art texts and discourses; 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 382A. Imperial Eyes: Court Arts of Ming Dynasty China

(Same as ARTHIST 182A.) Coincides with a major loan exhibition of Ming court arts at the Asian Art Museum of San Francisco. How Ming dynasty emperors, aristocrats, eunuchs and officials used art patronage to assert political power and cultural values. Major Chinese court art forms and media, including painting, porcelain, textiles, furniture, and metalwork. Topics include styles and modes of signification, artists' careers and artist-patron relationships, court institutions, and the impact of court arts on the wider world. Field trips to the exhibition at the Asian Art Museum.

4 units, Sum (Vinograd, R)

ARTHIST 384. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting

(Same as ARTHIST 184.) The changes marking the transition from medieval to early modern Japanese society 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.

4 units, not given this year

ARTHIST 385. Art in China's Modern Era

(Same as ARTHIST 185.) From the late Ming period to contemporary arts. Topics: urban arts and print culture; commodification of art; painting theories; self portrayals; court art, collection, and ideological programs; media and modernity in Shanghai; politics and art in the People's Republic; and contemporary avant garde and transnational movements.

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, Aut (Vinograd, R)

ARTHIST 387. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868

(Same as ARTHIST 187, JAPANGEN 87.) 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, Win (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 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. 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 393A. Caribbean and Latin American Art: Empire, Identity, and Society

(Same as ARTHIST 193A.) Visual culture from 1505 to 1889 and its relation to current debates on cultural identity, hybridity, syncretism, and creolization. Painting, travel books, and printmaking by artists including De Bry, Belisario, Rugendas, Debret, and Landaluce. Visual analysis of works at the Yale Center for the British Art and Stanford's Green Library.

4 units, not given this year

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 408A. Imperial Representation and Power in Late Antique Art and Architecture

New monumental imperial buildings created beginning in the tetrarchic period in Europe and the Middle East such as the basilica of Maxentius, Diolcetian's residence in Split, Constantine's palace in Trier, and Galerius' residences at Salonica and Gamzigrad. Decoration of these buildings with marble revetment, mosaics, and sculptures and statues, often innovative by their ideological references to classical models. Tradition and innovation, rhetoric and function.

5 units, Aut (Brenk, 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, Spr (Pentcheva, B)

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 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, Aut (Hansen, M)

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, Win (Wolf, B)

ARTHIST 430A. Modernity and 19th-Century Visual Culture

The relationship between visuality and modernity; the privileged role

played by seeing. Sources include paintings and literary texts organized around questions of perception. Topics include: visuality and the public sphere; landscape and depoliticized speech; genre and hegemony; race and identity; post-liberal and postmodern culture.

5 units, not given this year

ARTHIST 430B. Modernity and 19th-Century Visual Culture
Writing workshop and reading group. The relationship between publication and professionalization. Students submit publishable papers to an appropriate journal. Recommended: 430A.

5 units, not given this year

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, Win (Gough, M)

ARTHIST 445. Intermedia Practices of the 1920s and 1930s
The emergence and proliferation of new intermedia practices in Weimar Germany, fascist Italy, and Soviet Russia as avant garde artists invented modes of agitation and propaganda appropriate to the protean ambitions of each state. Focus is on monumental photography, wherein the medium of photography was mobilized on an architectural scale in interior spaces, exhibitions, and urban environments, and on the photo essay, a radicalization of the traditional amalgam of pictures and text made possible by advances in printing technologies. The historical avant garde's significance for postwar debates about media hybridity and the society of the spectacle.

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 andmodern 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, Spr (Turner, F; Lee, P)

ARTHIST 484. Exhibition Seminar in East Asian Art: From the Bronze Age of China to Japan's Floating World
Collaborative planning, research, text writing, and design for the summer 2009 exhibition of recent acquisitions of East Asian art at the Cantor Center. Topics include exhibition theory and organization, connoisseurship issues, and practices of display. Students may prepare papers for publication in the Cantor Center's journal, and contribute introductory and label texts for the exhibition. Advanced undergraduates require consent of instructors.

5 units, Win (Vinograd, R)

ARTHIST 485. The Situation of the Artist in Traditional Japan
(Same as JAPANGEN 220.) 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 501. The Vision of Art History
How the project of art history connects to general issues of historical writing and evidence. Focus is on modes of vision, such as the perceptual, conceptual, and historical, and the clusters of related limitations they bring to the problem of art history. The overlapping areas of blindness inherent in art-historical scholarship. How options within the field are conditioned and shaped by the central, founding activity of the discipline.

5 units, not given this year

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, psychoanalysis, and Marxist and feminist approaches to the work of art. Limited enrollment.

5 units, Aut (Lee, P)

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 512. The Time of the Object
How artists, art historians, philosophers, and critics have theorized the temporality of the art object. Topics: the origin of the work of art, duration, repetition, entropy, kineticism, the monument, the end of death of art, schizophrenia. Writers: Bergson, Deleuze, Focillon, Fried, Hegel, Heidegger, Jameson, Kubler, Krauss, Riegl.

5 units, not given this year

ARTHIST 516. Narrative Theory and Visual Form
The theoretical terrain of narrative studies in literary criticism and historiography. The critical implications of narrative analysis for the writing of history in general. Readings integrated with students' current research projects.

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

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ARTHIST 650. Dissertation Research

5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ARTHIST 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)

ARTHIST 660E. Extended Seminar
May be repeated for credit.

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

OVERSEAS STUDIES COURSES IN ART HISTORY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN ART HISTORY COURSES

OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin

4-5 units, Aut (Pabsch, M)

FLORENCE ART HISTORY COURSES

OSPFLOR 34. The Woman in Florentine Art

4 units, Aut (Verdon, T)

OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition
4 units, Win (Rossi, F; Verdon, T)

OSPFLOR 54. High Renaissance and Maniera
5 units, Spr (Verdon, T)

OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence
4 units, Win (Verdon, T)

OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization
4 units, Aut (Verdon, T)

OXFORD ART HISTORY COURSES

OSPOXFRD 221Y. Art and Society in Britain
4-5 units, Win (Tyack, G)

PARIS ART HISTORY COURSES

OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design
4 units, Spr (Halevi, E)

OSPPARIS 107Y. The Age of Cathedrals: Religious Art and Architecture in Medieval France
4 units, Aut (Deremble, C; Deremble, J)

OSPPARIS 120X. French Painting in the 19th Century: Between Tradition and Revolution
4 units, Win (Halevi, E)

ART STUDIO (ARTSTUDI) COURSES

For information on undergraduate and graduate programs in the Practice of Art (Studio), see the "Art and Art History" section of this bulletin.

UNDERGRADUATE COURSES IN ART STUDIO

ARTSTUDI 14. Drawing for Non-Majors
2 units, Aut (Anderson, D)

ARTSTUDI 16. Sculpture for Non-Majors
2 units, Win (Arcega, M), Spr (Shiho, K)

ARTSTUDI 17. Photography for Non-Majors
2 units, not given this year

ARTSTUDI 18. Video for Non-Majors
2 units, Win (van Tonder, J)

ARTSTUDI 19. Collage for Non-Majors
2 units, Aut (Valentine, J)

ARTSTUDI 30. Introductory Survey: Concepts and Strategies
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. (lower level)
3 units, Win (Staff)

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 (Kahn, M), Win (Edmark, J), Spr (Edmark, J)

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 (Leivick, J), 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, not given this year

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, Spr (DeMarinis, P)

ARTSTUDI 137. Wireless
Technologies to scan the radio frequency signals that permeate the modern environment and to create art works that extend invisibly through space. Topics incluce spark telegraphy, Bluetooth and wireless networks, antennas, chips, encryption, propaganda, and surveillance. (upper level)
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, Win (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 (Bersamina, L)

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, Win (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 (Bean, K), Win (Kemp, A), Spr (Solomon, N)

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, Aut (Hannah, D), Spr (Chagoya, E)

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, Aut (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, Spr (Kain, K)

ARTSTUDI 149. Collage
Generative principles. Assemblage (its three dimensional equivalent) and montage (its counterpart in photography, film, and video). How collage introduced aesthetic issues of the modern and postmodern eras, and 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 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. (lower level)
4 units, Aut (Berlier, T), Win (Berlier, T)

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 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: 60. (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. Field trips. (lower level)
3-4 units, Win (Edmark, J)

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, cutout/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, Aut (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, Spr (Kahn, M)

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 171. Color Photography
Intermediate. Topics include techniques, history, color theory, and perception of color. Contemporary color photography issues and concepts. Students work with color slides and negatives, digital color, and non-traditional techniques. Field trip to a color lab. Prerequisite: 70. (upper level)
4 units, not given this year

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, Aut (Buckholtz, E)

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 (Hicks, A)

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, Win (Staff)

ARTSTUDI 178. Electronic Art I
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, Spr (McKay, J)

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 (Wight, G)

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)
4 units, Win (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 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 (Felzmann, L), 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, Spr (Felzmann, L)

GRADUATE COURSES IN ART STUDIO

For graduate students only.

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 (Berlier. T: Hannah, D), Win (Wight, G; DeMarinis, P), Spr (Chagoya, E)

ARTSTUDI 360A. Master's Project: Design
1-15 units, Aut (Kahn, M)

ARTSTUDI 360B. Master's Project: Design
1-15 units, Win (Kahn, M)

ARTSTUDI 360C. Master's Project: Design
1-15 units, Spr (Kahn, M)

OVERSEAS STUDIES COURSES IN ART STUDIO

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE ART STUDIO COURSES

OSPFLOR 41. The Contemporary Art Scene in Tuscany: Theory and Practice
3-5 units, Aut (Rossi, F)

OSPFLOR 55. Academy of Fine Arts: Studio Art
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPFLOR 71. Becoming an Artist in Florence: Contemporary Art in Tuscany and New Tendencies in the Visual Future
3-5 units, Spr (Rossi, F)

OSPFLOR 94. Photography in Florence
4 units, Win (Loverme, C)

PARIS ART STUDIO COURSES

OSPPARIS 42. EAP: Drawing with Live Models
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 43. EAP: Painting and Use of Color
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 44. EAP: Graphic Art
2 units, Aut (Staff), Win (Staff), Spr (Staff)

ASIAN AMERICAN STUDIES (ASNAMST) COURSES

For information on undergraduate programs in Asian American Studies, see the "Comparative Studies in Race and Ethnicity" section of this bulletin.

UNDERGRADUATE COURSES IN ASIAN AMERICAN STUDIES

ASNAMST 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges
(Same as 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 (Staff)

ASNAMST 180C. Asian American Sexualities
(Same as CSRE 180C, PSYCH 180C.) Seminar. Mutual constitution of culture and sexuality among Asian Americans; attitudes, behaviors, taboos, and identity. How masculinity and femininity are portrayed in the media; cultural attitudes toward homosexuality; and sexual politics. Social, political, and psychological implications.
5 units, not given this year

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, Win (Lee, 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

See the "Athletics, Physical Education, and Recreation" section of this bulletin for more information on the Department of Athletics, Physical Education, and Recreation. See http://www.stanford.edu/dept/pe for further information on courses and sign-up procedures.

UNDERGRADUATE COURSES IN ATHLETICS, PHYSICAL EDUCATION, AND RECREATION

ATHLETIC 2. Abs and Glutes
Lower body workout to strengthen glutes and thighs, and abdominal training. Fee. (AU)
1 unit, Aut (Sanders, B), Win (Sanders, B), Spr (Sanders, B), Sum (Conniff, N)

ATHLETIC 4C. Archery Club Team (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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, Win (Mack, K)

ATHLETIC 8C. Badminton Club Team (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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 17. Body Blast and Sculpt
Full body workout using weights, bands, and body bars. Fee. (AU)
1 unit, Aut (Mandell, M), Win (Mandell, M), Spr (Mandell, M)

ATHLETIC 19C. Canoe and Kayak Club (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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 (Mandell, M)

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 28V. Cross Country, Varsity Men (AU)
1-2 units, Aut (Tegen, P)

ATHLETIC 29V. Cross Country, Varsity Women (AU)
1-2 units, Aut (Tegen, P)

ATHLETIC 31C. Cycling Club Team (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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 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 (Naulo, V), Win (Naulo, V), Spr (Naulo, V)

ATHLETIC 40. Fencing, Advanced Beginning
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, Aut (Naulo, V), Win (Naulo, V), Spr (Naulo, V)

ATHLETIC 41V. Fencing, Varsity Men (AU)
1-2 units, Aut (Posthumus, E), Win (Posthumus, E), Spr (Posthumus, E)

ATHLETIC 42V. Fencing, Varsity Women (AU)
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), Spr (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 (Irvine, L), Spr (Irvine, L)

ATHLETIC 49V. Football, Varsity (AU)
1-2 units, Aut (Harbaugh, J), Spr (Harbaugh, J)

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 (Marrone, P), 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 (Shaw, D), Win (Marrone, P), Spr (Miller, J), Sum (Miller, J)

ATHLETIC 53. Golf: Intermediate
Drills and practice. How to lower scores and manage the game on the course. Prerequisite: 52 or equivalent. Fee. (AU)
1 unit, Aut (Shaw, D), Win (Marrone, P), 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 (Miller, J), 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 (Swircek, C), Spr (Swircek, C)

ATHLETIC 59. Gymnastics: Intermediate
For students who have completed 58 or have a background in gymnastics. Emphasis is on tumbling and somersaulting. Group work and individualized instruction for men and women. Limited apparatus work. Fee. (AU)
1 unit, Aut (Thompson, D), Win (Thompson, D), Spr (Thompson, D)

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 (Bell, M; Miller Bell, A), Win (Bell, M; Miller Bell, A), Spr (Bell, M; Miller Bell, A), Sum (Miller Bell, A)

ATHLETIC 65. Horsemanship: Beginning Riding
No experience needed. Basic horsemanship and riding at the walk, trot and canter. Fee. (AU Bartsch)
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 (Staff), Win (Staff), Spr (Staff)

ATHLETIC 72C. Ice Hockey Club Team Men (AU)
1 unit, Aut (Staff), Win (Staff)

ATHLETIC 74C. Judo Club Team (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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), Sum (Mandell, M)

ATHLETIC 77C. Lacrosse Club Team (Men) (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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)

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 (Staff), Spr (Staff)

ATHLETIC 83. Introduction to Martial Arts
Techniques, training methods, history, and culture of Asian martial arts. Three styles per quarter. Warm-ups, fundamental techniques, basic application, and conditioning. Fee.
1 unit, Aut (Ghormley, T), Win (Ghormley, T), Spr (Ghormley, T)

ATHLETIC 84. 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/.
1 unit, Aut (Moore, S; Nash-Webber, C), Win (Moore, S; Nash-Webber, C), Spr (Moore, S; Nash-Webber, C)

ATHLETIC 87. 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 (Staff), Win (Staff), Spr (Staff)

ATHLETIC 89. Rowing, Beginning
The ergometer rowing machine, spin bikes, and rowing shells. Sports nutrition and physiology. Fee.
1 unit, Aut (Amerkhanian, C; Farooq, Y)

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), Sum (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 (Staff), Win (Staff), Spr (Staff)

ATHLETIC 97. Sailing, Beginning: Keelboat
Basic skills, theory, and techniques enable beginners to sail a 24'-30' fixed keelboat with confidence. Emphasis is on safety and seamanship skills. Fee. (AU)
1 unit, not given this year

ATHLETIC 98. Sailing, Beginning: Dinghy
Skills, theory, and techniques to enable beginners to sail with confidence in small centerboard boats. Fee. (AU)
1 unit, Aut (Staff), Spr (Storck, E)

ATHLETIC 99. Sailing, Intermediate: Dinghy
Refine skills. Introduction to racing. Prerequisite: consent of instructor. Fee. (AU)
1 unit, Aut (Staff), Spr (Storck, E)

ATHLETIC 101. Sailing: Beginning Dinghy Racing
Racing rules, strategy, tactics, and more advanced boat handling. Enrollment limited to 14. Fee. (AU)
1 unit, Spr (Staff)

ATHLETIC 102. Sailing: Assistant Instructor (Beginning Level)
2 units, Aut (Staff), Spr (Staff)

ATHLETIC 103. Sailing: Assistant Instructor (Intermediate/Advanced Level)
2 units, Aut (Staff), Spr (Staff)

ATHLETIC 104V. Sailing, Varsity Men (AU)
1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

ATHLETIC 105V. Sailing, Varsity Women (AU)
1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

ATHLETIC 107C. Ski Club Team (AU)
1 unit, Win (Staff)

ATHLETIC 109. Social Dance, Beginnning
Introduction to partner dancing. Steps, styling, and rhythms in popular social dances such as tango, salsa, waltz, cha-cha, and foxtrot. No experience or partner necessary. Fee. (AU)
1 unit, Aut (Sun, R), Win (Sun, R), Spr (Sun, R)

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, Aut (Staff), Spr (Becerra II, R; Cooney Jr, 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 Jr, J; Becerra II, 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 Jr, 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: Intermediate/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 123. Squash, Beginning
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 124. Squash: Intermediate/Advanced
Continuation of 123. Fee. May be repeated for credit. (AU)
1 unit, Aut (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 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 (Whildin, S), 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 (Vargas, J), Spr (Knapp, T)

ATHLETIC 134. Synchronized Swimming, Beginning
Basic skills and techniques. Prerequisite: intermediate to advanced swimming skills. Fee. (AU)
1 unit, Aut (Olson, H), Spr (Olson, H)

ATHLETIC 135V. Swimming, Synchronized: Varsity (AU)
1-2 units, Aut (Olson, H), Win (Olson, H), Spr (Olson, H)

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 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 (Coupe, B), Spr (Sarsfield, T), Sum (McRoberts, S)

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 (Coupe, B), Win (Brennan, F), Spr (Sarsfield, T), Sum (McRoberts, S)

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 (Brennan, F), Win (Gould, A), Spr (Sarsfield, T), Sum (McRoberts, S)

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 (McRoberts, S)

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 (Sanders, B), Win (Sanders, B), Spr (Sanders, 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 (Staff), Win (Staff), Spr (Staff)

ATHLETIC 158C. Ultimate Frisbee Club Team (Men) (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

ATHLETIC 159C. Ultimate Frisbee Club Team (Women) (AU)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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 (Corlett, D)

ATHLETIC 163. Volleyball: Introduction to Sand
Fundamental skills and rules. Strategy in two- and four-person sand volleyball. Fee. (AU)
1 unit, not given this year

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 (Shibuya, K)

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 (Shibuya, K)

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 (Borrelli, J), Spr (Borrelli, J)

ATHLETIC 175. Weight Training: Intermediate
Review of exercises and techniques. Emphasis is on individualized programs and learning the use of all available machines and free weights. Exercise physiology. Prerequisite: 174 or equivalent. Fee. (AU)
1 unit, Aut (Staff)

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 (Allister, J), Win (Allister, J)

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 179. Wrestling: Beginning/Intermediate
Intercollegiate wrestling. Conditioning, cultivating the spirit of one-on-one competition. Basic skills and high-level sequences of upper- and lower-body technique. Fee. (AU)
1 unit, Spr (Staff)

ATHLETIC 180V. Wrestling, Varsity
(AU)
1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

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 185. Yoga: Theory and Practice
The intellectual and experiential understanding of the more than 4,000 year history of mind-body-spirit traditions and practices; their applications in medicine, health promotion, psychology, business, athletics, and the creative arts. Movements and exercises that promote physical and emotional health, reduce stress, and optimize performance.
2 units, Win (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), 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, Aut (Luskin, F)

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.
1-3 units, Spr (Wilson, C)

BIOCHEMISTRY (BIOC) COURSES

For information on undergraduate and graduate programs in the Department of Biochemistry, see the "Biochemistry" section of this bulletin.

UNDERGRADUATE COURSES IN BIOCHEMISTRY

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 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, not given this year

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 hosted by Biochemistry, Developmental Biology, and Genetics in which distinguished 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; Tan, M; Villeneuve, A), Win (Harbury, P; Tan, M; Villeneuve, A)

BIOC 218. Computational Molecular Biology
(Same as BIOMEDIN 231.) Via Internet. 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 BIO 41 or consent of instructor.

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; Herschlag, D; Chen, J), 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.) 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; Pfeffer, S; Nelson, W; Theriot, J; Straight, A)

BIOC 225. Interdisciplinary Approaches to Cell Biology: the Role of the Cytoskeleton
The molecular basis of energy transduction leading to movements generated by microfilament-based and microtubule-based motors. Forms of myosin, dynein, and kinesin and their roles in the cell as a model for understanding the structural, biochemical, and functional properties of biological machines. Topics: structure of the molecular motors and their accessory proteins; regulation of the function of motile assemblies; functions of molecular motors in cells; spatial and temporal controls on the formation of motile assemblies in cells. Experimental approaches: genetic analysis, DNA cloning and expression, reconstitution of functional assemblies from purified proteins, x-ray diffraction, three-dimensional reconstruction of electron microscope images, spectroscopic methods, high-resolution light microscopy, and computational approaches. Prerequisites: basic biochemistry and cell biology.

3 units, not given this year

BIOC 228. Computational Genomic Biology
(Same as BIOMEDIN 228.) Application of computational genomics methods to biological problems. Topics include: assembly of genomic sequences; genome databases; comparative genomics; gene discovery; gene expression analyses including gene clustering by expression, transcription factor binding site discovery, metabolic pathway discovery, functional genomics, and gene and genome ontologies; and medical diagnostics using SNPs and gene expression. Recent papers from the literature and hands-on use of the methods. Prerequisites: introductory course in computational molecular biology or genomics such as BIOC 218, BIOMEDIN 214 or GENE 211.

3 units, Win (Brutlag, D)

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, Aut (Theriot, J; Harbury, P)

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, Win (Theriot, J; Fisher, D)

BIOC 238. Computational Proteomic Biology
(Same as BIOMEDIN 238.) Application of computational protein analysis to biological problems. Topics include: protein sequence analysis and comparison including protein sequence databases, amino acid composition, protein alignment, protein motifs, protein families, and probabilistic models of families; protein structure including structure comparison and superposition methods, structural motifs, and structure and domain databases; protein structure prediction including secondary structure, homology modeling, threading, and ab initio structure prediction; protein-protein interaction databases and protein-protein interaction prediction; and protein-DNA interaction motifs and protein-ligand docking. Prerequisite: An introductory course in computational bioloby such as BIOC 218, BIOMEDIN 214, or SBIO/BIOPHYS 228. Via Internet in Spring.

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, 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. Prerequisites: introductory biochemistry and physical chemistry or consent of instructor.

3-5 units, Aut (Herschlag, D; Puglisi, J; Garcia, K; Ferrell, J; Block, S; Weis, W)

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 278. Systems Biology
(Same as BIOE 310, CS 278, CSB 278.) 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.

3 units, Aut (Covert, M; Dill, D; Brutlag, D; Ferrell, 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. Aut (Brown, P), Win (Brown, P), Spr (Brown, P), Sum (Brown, P)

BIOC 299. Directed Reading in Biochemistry
Prerequisite: consent of instructor.

1-18 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, Win, Spr (Robertson, C)

BIOENGINEERING (BIOE) COURSES

For information on undergraduate and graduate programs in the Department of Bioengineering, see the "Bioengineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN BIOENGINEERING

BIOE 70Q. Medical Device Innovation
Stanford Introductory Seminar. Preference to sophomores. Commonly used medical devices in different medical specialties. Guest lecturers include Stanford Medical School physicians, entrepreneurs, and venture capitalists. How to identify clinical needs and design device solutions to address these needs. Fundamentals of starting a company. Field trips to local medical device companies; workshops. No previous engineering training required.

3 units, Spr (Mandato, J; Milroy, J; Doshi, R)

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.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN BIOENGINEERING

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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: 210, 211 or 214, or consent of instructor.

3 units, Aut (Altman, R; Cheng, B; Klein, T)

BIOE 214. Representations and Algorithms for Computational Molecular Biology
(Same as BIOMEDIN 214, CS 274, GENE 214.) Topics: algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, computing with networks of genes, 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, graphical display of biological data, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Spr (Altman, R)

BIOE 220. Imaging 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.) Instruments for imaging molecular and cellular events in animals and human beings using novel assays. Instrumentation physics, chemistry of molecular imaging probes, and applications to preclinical models and clinical disease management.

4 units, Aut (Gambhir, S; Rao, J)

BIOE 222B. Multimodality Molecular Imaging in Living Subjects II
(Same as RAD 222B.) In vivo imaging techniques and applications to preclinical models and clinical disease management. Focus on cancer research, neurobiology, cardiovascular and musculoskeletal diseases.

2 units, Win (Gambhir, S; Rao, J)

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, Aut (Deisseroth, K; Palmer, T)

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, Aut (Delp, S)

BIOE 284A. Cardiovascular Bioengineering

(Same as ME 284A.) Via Internet. 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.) Via Internet. Continuation of ME 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 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 a 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, Aut (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. Limited enrollment. Corequisite: 300B.

1 unit, Win (Feinstein, J)

BIOE 310. Systems Biology

(Same as BIOC 278, CS 278, CSB 278.) 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.

3 units, Aut (Covert, M; Dill, D; Brutlag, D; 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), alternate years, not given next year

BIOE 332A. Large-Scale Neural Modeling

Emphasis is on cortical computation, from feature maps in the neocortex to episodic memory in the hippocampus, with attention to the roles of recurrent connectivity, rhythmic activity, spike synchrony, synaptic plasticity, and noise and heterogeneity. Large-scale models run in real-time on neuromorphic hardware developed for this purpose. Techniques to analyze and predict network behavior; applications to data recorded from models in laboratory. Techniques introduced are used to develop projects in second half of two-quarter sequence.

3 units, Win (Boahen, K)

BIOE 332B. Large-Scale Neural Modeling

Emphasis is on cortical computation, from feature maps in the neocortex to episodic memory in the hippocampus, with attention to the roles of recurrent connectivity, rhythmic activity, spike synchrony, synaptic plasticity, and noise and heterogeneity. Simulation exercises to model neural phenomena; quantitative techniques to analyze and predict network behavior; modeling projects to study neural systems of interest. Student teams of two run large-scale models in real-time on neuromorphic hardware developed for this purpose. Prerequisite: 332A.

3 units, Spr (Boahen, K)

BIOE 333. Interfacial Phenomena and Bionanotechnology

How biological, biochemical, environmental, and bioengineering problems require understanding of the properties of systems of large interfacial area and surface-active molecules. Concepts used by Laplace, Gibbs, Kelvin, and Young to describe these systems. Self-assembling aspects of surface-active molecules including biological molecules. The relevance of interfacial phenomena to protein folding/unfolding and microfluidic devices. Applications to recent research advances in bionano- and biomicrotechnology, drawing from the 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, Aut (Staff)

BIOE 335. Molecular Motors I: F1 ATPase

Physical mechanisms of mechanochemical coupling in biological molecular motors, using F1 ATPase as the principal 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, Aut (Sanger, T)

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 BIO 41, or equivalent.

3 units, Spr (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)

BIOE 374A. Biodesign Innovation: Needs Finding and Concept Creation
(Same as ME 368A, MED 272A, OIT 581.) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.

2 units, Win (Yock, P; Zenios, S; Brinton, T; Milroy, C)

BIOE 374B. Biodesign Innovation: Concept Development and Implementation
(Same as ME 368B, MED 272B, OIT 583.) 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.

2 units, Spr (Yock, P; Zenios, S; Brinton, T; Milroy, C)

BIOE 375A. Biodesign Innovation, Project A
(Same as ME 369A, MED 273A, OIT 582.) Interdisciplinary student teams select a medical need, characterize it fully, develop a needs statement, invent potential conceptual approaches to solving the need, and pursue initial prototyping and planning for regulatory and reimbursement pathways. Guest experts. Corequisite: MED 272A/BIOE 374A/ME 368A/OIT 581.

2 units, Win (Yock, P; Zenios, S; Milroy, C; Brinton, T)

BIOE 375B. Biodesign Innovation, Project B
(Same as ME 369B, MED 273B, OIT 584.) Interdisciplinary teams select the most promising invention from BIOE 375A and move into prototyping and project planning. Teams develop strategies for patenting, FDA submission, third-party reimbursement, licensing agreement or launching a start-up, including cash forecasting and business plan. Prerequisites: MED 375A/ME 369A/BIOE 375A/OIT 582. Corequisite: MED 272B/ME 368B/BIOE 374B/OIT 583.

2 units, Spr (Yock, P; Milroy, C; Brinton, T; Zenios, S)

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.

1-2 units, Aut (Taylor, C), Win (Taylor, C)

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 (Altman, R), Win (Altman, R), Spr (Altman, R)

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, Win, Spr (Robertson, C)

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, Spr (Figueroa Alvarez, C)

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, Spr (Delp, S)

BIOE 500. Thesis (Ph.D.)

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOLOGY (BIO) COURSES

For information on undergraduate and graduate programs in the Department of Biology, see the "Biology," section of this bulletin. Course and laboratory instruction in the Department of Biology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html. See the "Biology, Hopkins Marine Station Courses" section of this bulletin for additional offerings of interest.

UNDERGRADUATE COURSES IN BIOLOGY

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, Spr (Ehrlich, P)

BIO 2. Current Research Topics in Biology

Primarily for sophomores interested in majoring in Biology. Weekly seminars by faculty: molecular biology and genetics; theory and mathematics in biology; ecology, physiology, and the environment; molecular and cellular aspects of neurobiology, immunology, and developmental biology; biological chemistry; behavioral biology; and evolution. May be repeated for credit.

1 unit, Aut (Riepel, A), Win (Riepel, A)

BIO 13N. Environmental Problems and Solutions

Stanford Introductory Seminar. Preference to freshmen. Students do independent investigations of current environmental problems, analyzing differing views of them and discussing possible solutions. Each student gives two seminar presentations and leads two seminar discussions. Short, documented position papers are written for policy makers. GER:DB-NatSci

3 units, Spr (Ehrlich, P)

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 15N. Environmental Literacy

Stanford Introductory Seminar. Preference to freshmen. Lack of public understanding of the details of most environmental problems is cited as a cause of environmental deterioration. Good citizenship requires literacy about the elements of the scientific and decision making processes that accompany most environmental issues: what can happen, what are the odds, how can the credibility of sources of expertise be assessed, which components of environmental debates deal with factual and theoretical issues, and which are political value judgments? GER:DB-NatSci

3 units, Win (Schneider, S)

BIO 20. Introduction to Brain and Behavior

(Same as HUMBIO 21.) Evolutionary principles to understand how the brain regulates behavior, described in physiological terms, and is 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 25N. Biogeography of Disease

Stanford Introductory Seminar. Preference to freshmen. Geographic distribution of disease. Biotic interactions among vectors, hosts, and environment. Influence of climatic and environmental change on spread and virulence of disease. Human and animal diseases. Primary literature. GER:DB-NatSci

3 units, Aut (Hadly, E)

BIO 25Q. The Molecular Basis of Genetic Disease

Stanford Introductory Seminar. Preference to sophomores. Focus is on two genetic diseases resulting from the production of protein molecules that are unable to fold into their native conformations, called conformational diseases: cystic fibrosis and amyotrophic lateral sclerosis or Lou Gehrig's disease. Hypotheses and controversies surrounding the molecular basis of these disorders, and implications for novel therapeutics. Readings from research literature. GER:DB-NatSci

3 units, Spr (Kopito, R)

BIO 26N. Maintenance of the Genome

Stanford Introductory Seminar. Preference to freshmen. Focus is on DNA repair systems which scan the genome to ensure genomic stability in the face of natural endogenous threats to DNA and those due to radiation and chemicals in the external environment. Redundancy of the genetic message ensured by complementary DNA strands facilitates recovery of information when one of the strands is altered. Predisposition to cancer often implicates a defective DNA repair gene. Relevance for oncology, aging, developmental biology, environmental health, and neurobiology. GER:DB-NatSci

3 units, Spr (Hanawalt, P)

BIO 30. Frontiers in Marine Science

The diversity of marine environments and their inhabitants; physical ocenaography; near shore and pelagic ecology; adaptations to aquatic life and extreme conditions; and global change, conservation, and the effects of human activity. Field trip to Stanford's Hopkins Marine Station; taught by Hopkins faculty.

2 units, Aut (Denny, M; Micheli, F; Somero, G)

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. GER:DB-NatSci

5 units, Aut (Simoni, R; Bergmann, D)

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. GER:DB-NatSci

5 units, Win (Cyert, M; Jones, P; Heller, C; 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. GER:DB-NatSci

5 units, Spr (Petrov, D; Gordon, D; Mudgett, M)

BIO 44X. Core Experimental Laboratory

Two quarters of lab projects provide a working familiarity with the concepts, organisms, and techniques of modern biological research. Emphasis is on experimental design, analysis of data, and 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. 44Y equivalent to BIOHOPK 44Y.

4 units, Win (Malladi, S)

BIO 44Y. Core Experimental Laboratory

Two quarters of lab projects provide a working familiarity with the concepts, organisms, and techniques of modern biological research. Emphasis is on experimental design, analysis of data, and 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. 44Y equivalent to BIOHOPK 44Y.

4 units, Spr (Malladi, S)

BIO 96A. Jasper Ridge Docent Training
Two quarter preparation for Stanford and community students 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.

4 units, Win (Dirzo, R; Wilber, C)

BIO 96B. Jasper Ridge Biological Preserve Docent Training Program
Two quarter preparation for Stanford and community students 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.

4 units, Spr (Dirzo, R; Wilber, C)

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. 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, Spr (Tuljapurkar, S)

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. Prerequisite: Biology core. GER:DB-NatSci

5 units, Win (Frydman, J; Gozani, O)

BIO 106. Human Origins
(Same as ANTHRO 6, 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, Win (Klein, R)

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. 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. Prerequisites: Biology core or graduate standing in any department, and consent of instructor. GER:DB-NatSci

4 units, not given this year

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 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. 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. GER:DB-NatSci

3 units, Spr (Hadly, E), alternate years, not given next 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. Experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Prerequisite: Biology core. GER:DB-NatSci

4 units, not given this year

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. Experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Prerequisite: Biology core. Recommended: 129A. GER:DB-NatSci

4 units, not given this year

BIO 130. Current Issues in Paleoanthropology
(Same as ANTHRO 162C, ANTHRO 262C.) Current issues in fossil, archaeological, and genetic evidence for human evolution. Topics chosen by participants. May be repeated for credit.
1 unit, Aut (DeGusta, D), Win (DeGusta, D), Spr (DeGusta, D)

BIO 132. Advanced Imaging Lab in Biophysics
(Same as 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; Schnitzer, M; Smith, S; Stearns, T)

BIO 133. Genetics of Prokaryotes
Genetic approaches for understanding cellular processes in bacteria, including metabolism, adaptive and stress responses, signal transduction, gene expression, genetic exchange and recombination, chromosome dynamics and evolution, cell division, motility, surface attachment, and developmental responses. Emphasis is on the power of effectively combining genetics with biochemistry, microscopy, and genomics. Prerequisite: Biology core. GER:DB-NatSci
4 units, Aut (Burkholder, W; Campbell, A), alternate years, not given next year

BIO 134. Replication of DNA
Seminar. Modes of DNA replication and their control in prokaryotes and eukaryotes. Structures, properties, and functions of DNA polymerases and associated factors. Emphasis is on experimental approaches and their limitations. Current research literature. Students prepare journal club style report and lead class discussions. Enrollment limited to 20 advanced undergraduates. Prerequisite: Biology core. Recommended: 118. GER:DB-NatSci
3 units, Win (Burkholder, W)

BIO 135. Biological Clocks
(Same as HUMBIO 186.) The biological basis for endogenous timekeeping in organisms from flies to human beings. How biological clocks are constructed at the molecular, tissue, and behavioral levels; how these clocks interact with other physiological systems and allow animals to anticipate changes in their environment. Applications of circadian rhythm principles to treating human disorders and diseases such as cancer. Prerequisite: Biology or Human Biology core, or consent of instructor. GER:DB-NatSci
3 units, not given this year

BIO 136. Evolutionary Paleobiology
A paleontological approach to evolutionary theory. History of life, speciation, heterochrony, evolutionary constraint, coevolution, macroevolution, Cambrian Explosion, mass extinctions, taphonomy, life on land, life in the sea, life in the air. GER:DB-NatSci
4 units, not given this year

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. 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. See http://www-stat.stanford.edu/~rag/stat141/. GER:DB-Math
4-5 units, Aut (Boik, J; Rogosa, D)

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. 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. 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. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics. GER:DB-NatSci
4 units, alternate years, not given this year

BIO 146. Population Studies
Series of talks by distinguished speakers introducing approaches to population and resource studies.
1 unit, Win (Tuljapurkar, S)

BIO 147. Controlling Climate Change in the 21st Century
(Same as BIO 247, EARTHSYS 147, 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, Win (Schneider, S; Mastrandrea, M), alternate years, not given next year

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, Win (Heller, C)

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, NBIO 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, alternate years, not given this year

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. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors. GER:DB-NatSci

4 units. Aut (Luo, L; Shen, K; Clandinin, T), alternate years, not given next year

BIO 157. Plant Biochemistry
(Same as BIO 257.) The biochemistry of plants relevant to their physiology and cell biology. Topics include: the biosynthesis, assembly, function, and regulation of cell walls; lipids; pigments; photoreceptors; transporters; and the response of plants to pathogens and stresses. Prerequisite: Biology core or equivalent, or consent of instructors. GER:DB-NatSci

3-4 units, Spr (Mudgett, M), alternate years, not given next year

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. Prerequisite: BIO 42 or equivalent. GER:DB-NatSci

4 units. Spr (McConnell, S; Shen, K; Garner, C), alternate years, not given next year

BIO 160A. Developmental Biology and Signal Transduction 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. Embryonic axis formation, cell fate specification, regulation of tissue and animal size, tissue regeneration, and the evolution of developmental mechanisms. Experimental logic and methods of research in developmental biology. Discussions of research papers. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

4 units, Win (Simon, M)

BIO 160B. Developmental Biology and Signal Transduction 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. Embryonic axis formation, cell fate specification, regulation of tissue and animal size, tissue regeneration, and the evolution of developmental mechanisms. Experimental logic and methods of research in developmental biology. Discussions of research papers. Prerequisites: Biology Core and BIO 160A, or consent of instructor. GER:DB-NatSci

4 units, Spr (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. Prerequisites: BIO 42, HUMBIO 4A, or equivalents. 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. Cellular and Molecular Therapeutic Approaches to Neurological Disorders
(Same as BIO 265.) Current therapeutic research for neurological conditions, including stroke, epilepsy, neurodegenerative disorders, depression, anxiety, and aging. Sources include primary literature. Guest lecturers.

1 unit, Win (Sorrells, S)

BIO 166. Fanual 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 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 Interactions
(Same as BIO 277.) Plant pathology and plant symbiosis.Topics include: prokaryotic and eukaryotic pathogens; molecular, genetic, and cellular basis for microbial pathogenicity and host defense; genetics and cell biology of nitrogen-fixing symbiosis and for mycorrhizal associations. Evolutionary context. 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.) Critical reading of the research literature in prokaryotic genetics and molecular biology. For advanced undergraduates and first or second year graduate students. Classic and foundational papers in microbiology and molecular biology; more recent literature on prokaryotic 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 180. Fundamentals of Sustainable Agriculture
(Same as BIO 280, EARTHSYS 180, EARTHSYS 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, Spr (Naylor, R), alternate years, not given next year

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, not given this year

BIO 185. Evolution of Reproductive Social Behavior
(Same as BIO 285.) Seminar. Controversies surounding theory and data for the evolution of sex, gender, and sexuality. Issues include the critique of Darwin's theory of sexual selection, and the accuracy of the metaphor of universal selfishness and sexual conflict in biological nature. Readings include Evolution's Rainbow and The Genial Gene, and primary literature. GER:DB-NatSci

3 units, Aut (Roughgarden, J), alternate years, not given next 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. Prerequisites: CHEM 135 or 171. GER:DB-NatSci

3 units, Win (Zare, R; Altman, D)

BIO 189. Biochemistry II
(Same as BIO 289, CHEMENG 183, CHEMENG 283, CHEM 183. CHEMENG offerings formerly listed as 189/289.) Metabolism. Glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, protein degradation and amino acid catabolism, protein translation and amino acid biosynthesis, nucleotide biosynthesis, DNA replication, recombination and repair, lipid and steroid biosynthesis. Medical consequences of impaired metabolism. Therapeutic intervention of metabolism. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). GER:DB-NatSci

3 units, Spr (Dunn, A)

BIO 191. Research in Bird Biology
Field research in ornithology emphasizing ecological relationships. Projects involve research, planned and carried out by the student in consultation with the instructor. Results are written in publication format. Enrollment limited. Prerequisites: 43, concurrent or subsequent enrollment in 139, and consent of instructor.

1-4 units, Win (Root, T), Spr (Root, T)

BIO 193. Undergraduate Journal Club
Weekly discussion, led by students and facilitated by faculty, for reading scientific literature and presenting papers. Prerequisites: Biology core and consent of instructor. Recommended: 199 or 199X.

1 unit, not given this year

BIO 198. Directed Reading in Biology
Individually arranged under 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)

GRADUATE COURSES IN BIOLOGY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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. 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; Barsh, G; Sidow, A)

BIO 205. DNA Repair and Genomic Stability
Interactions of endogenous and environmental mutagens with cellular DNA. Cellular responses to damaged DNA including molecular mechanisms for DNA repair, translesion DNA synthesis, and genetic recombination. Inducible repair responses and error-prone mechanisms. Human hereditary diseases that predispose to cancer. Relationships of DNA repair to mutagenesis, carcinogenesis, aging, and human genetic disease. Current research literature. Prerequisites: 41 and 118, or consent of instructor.

3 units, Spr (Hanawalt, P)

BIO 206. Field Studies in Earth Systems
(Same as 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.

5 units. Spr (Chiariello, N; Dirzo, R; Field, C; Fendorf, S; Freyberg, D; Matson, P), alternate years, not given next 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. Topics: protein folding and assembly, mechanisms of chaperone action, sorting into organelles and the ubiquitin-proteasome pathway. Enrollment limited to 20.

3 units, Spr (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 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. Prerequisite: Biology or Human Biology core.
4 units, Win (Garza, D)

BIO 213. Biology of Viruses
Principles of virus growth, genetics, architecture, and assembly. The relation of temperate viruses and other episomes to the host cell. Prerequisite: Biology core. Recommended: 118.
3 units, Win (Campbell, A)

BIO 214. Advanced Cell Biology
(Same as 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; Pfeffer, S; Nelson, W; Theriot, J; Straight, A)

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)

BIO 216. Terrestrial Biogeochemistry
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, Win (Schnitzer, M)

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. 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, not given this year

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. 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

BIO 230. Molecular and Cellular Immunology
For graduate students and advanced undergraduates. Components of the immune system: structure and functions 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. 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
Supplement to 230. Corequisite: 230.
1 unit, Aut (Staff)

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, Spr (Tuljapurkar, S), alternate years, not given next year

BIO 232. Advanced Imaging Lab in Biophysics
(Same as 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; Schnitzer, M; Smith, S; Stearns, T)

BIO 235. Challenges for Biodiversity Conservation in Latin America
The largest megadiversity countries including Brazil and México. The conceptual basis of biodiversity conservation. Case studies. Topics include: habitat loss, threatened species, and hotspots; threats to the Amazon, Atlantic forest, Pantanal, and cerrado; impact of hunting; and the conflict between protected areas and parks.
3 units, Aut (Galetti, M)

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. 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.
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. Prerequisites: Biology core or graduate standing in any department, and consent of instructor.
4 units, not given this year

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. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics.

4 units, alternate years, not given this year

BIO 247. Controlling Climate Change in the 21st Century
(Same as BIO 147, EARTHSYS 147, 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.

3 units, Win (Schneider, S; Mastrandrea, M), alternate years, not given next year

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, Win (Heller, C)

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. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors.

5 units, Aut (Luo, L; Shen, K; Clandinin, T), alternate years, not given next year

BIO 257. Plant Biochemistry
(Same as BIO 157.) The biochemistry of plants relevant to their physiology and cell biology. The biosynthesis, assembly, function, and regulation of cell walls; lipids; pigments; photoreceptors; transporters; and the response of plants to pathogens and stresses. Prerequisite: Biology core or equivalent, or consent of instructors.

3-4 units, Spr (Mudgett, M), alternate years, not given next year

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), 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. Prerequisites: BIO 42, HUMBIO 4A, or equivalents.

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. 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 265. Cellular and Molecular Therapeutic Approaches to Neurological Disorders
(Same as BIO 165.) Current therapeutic research for neurological conditions, including stroke, epilepsy, neurodegenerative disorders, depression, anxiety, and aging. Sources include primary literature. Guest lecturers.

1 unit, Win (Sorrells, S)

BIO 266. Fanual 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, not given this year

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 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)

BIO 277. Plant/Microbe Interactions
(Same as BIO 177.) Plant pathology and plant symbiosis.Topics include: prokaryotic and eukaryotic pathogens; molecular, genetic, and cellular basis for microbial pathogenicity and host defense; genetics and cell biology of nitrogen-fixing symbiosis and for mycorrhizal associations. Evolutionary context. 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.) Critical reading of the research literature in prokaryotic genetics and molecular biology. For advanced undergraduates and first or second year graduate students. Classic and foundational papers in microbiology and molecular biology; more recent literature on prokaryotic 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 280. Fundamentals of Sustainable Agriculture
(Same as BIO 180, EARTHSYS 180, EARTHSYS 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, Spr (Naylor, R), alternate years, not given next year

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, not given this year

BIO 285. Evolution of Reproductive Social Behavior
(Same as BIO 185.) Seminar. Controversies surounding theory and data for the evolution of sex, gender, and sexuality. Issues include the critique of Darwin's theory of sexual selection, and the accuracy of the metaphor of universal selfishness and sexual conflict in biological nature. Readings include Evolution's Rainbow and The Genial Gene, and primary literature.

3 units, Aut (Roughgarden, J), alternate years, not given next 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. Prerequisites: CHEM 135 or 171.

3 units, Win (Zare, R; Altman, D)

BIO 289. Biochemistry II
(Same as BIO 189, CHEMENG 183, CHEMENG 283, CHEM 183. CHEMENG offerings formerly listed as 189/289.) Metabolism. Glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, protein degradation and amino acid catabolism, protein translation and amino acid biosynthesis, nucleotide biosynthesis, DNA replication, recombination and repair, lipid and steroid biosynthesis. Medical consequences of impaired metabolism. Therapeutic intervention of metabolism. 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 290X. Out-of-Department Teaching
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. Must be taken prior to teaching either of the above courses. May be repeated for credit. Prerequisite: selection by instructor.

1-2 units, Aut (Staff), 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, alternate years, not given this year

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 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 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 (Bergmann, D; Gozani, O), Win (Bergmann, D; Gozani, O)

BIO 302. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year graduate students in population biology, and ecology and evolution; open to all graduate students. Major conceptual issues and developing topics.

1 unit, Aut (Watt, W)

BIO 303. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year graduate students in population biology, and ecology and evolution; open to all graduate students. Major conceptual issues and developing topics.

1 unit, Win (Watt, W)

BIO 304. Current Topics and Concepts in Population Biology, Ecology, and Evolution
Required of first-year graduate students in population biology, and ecology and evolution; open to all graduate students. Major conceptual issues and developing topics.

1 unit, Spr (Watt, W)

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)

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: graduate standing 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, Spr (Watt, W)

BIO 325. The Evolution of Body Size
(Same as GES 325.) The influence of organism size on evolutionary and ecological patterns and processes. Focus is on integration of theoretical principles, observations of living organisms, and data from the fossil record. What are the physiological and ecological correlates of body size? Is there an optimum size? Do organisms tend to evolve to larger size? Does productivity control the size distribution of consumers? Does size affect the likelihood of extinction or speciation? How does size scale from the genome to the phenotype? How is metabolic rate involved in evolution of body size? What is the influence of geographic area on maximum body size?

2 units, not given this 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, Aut, Win, Spr (Burkholder, W; Cyert, M; Fang, G; Frydman, J; Kopito, R; Stearns, T)

BIO 346. Advanced Seminar on Prokaryotic Molecular Biology
Enrollment limited to graduate students associated with departmental research groups in genetics or molecular biology.

1 unit, Aut, Win, Spr (Long, S; Campbell, A; Spormann, A; Grossman, A; Burkholder, W; Yanofsky, C)

BIO 358. Advanced Topics in Biology
Restricted to doctoral and medical students in neurobiology labs. May be repeated for credit.
1 unit, Aut (Fernald, R; Luo, L; McConnell, S; Shen, K), Win (Fernald, R; Luo, L; McConnell, S; Shen, K), Spr (Fernald, R; Luo, L; McConnell, S; Shen, K), Sum (Staff)

BIO 383. Seminar in Population Genetics
Literature review, research, and current problems in the theory and practice of population genetics and molecular evolution. Prerequisite: consent of instructor.
1-3 units, not given this year

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, Aut (Roughgarden, J), Win (Roughgarden, J), Spr (Roughgarden, J)

BIO 385. Speaking About Science
Communication about science occurs in settings such as presenting scientific work to an audience of peers, communicating difficult concepts in a classroom, or describing a new finding to a reporter. Focus is on practice in speaking about science, emphasizing strategies for making difficult ideas easy to understand and integrating visual aids into oral presentations. Limited to Ph.D. students.
2 units, alternate years, not given this year

BIO 388. Communication and Leadership Skills
(Same as IPER 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, Spr (Root, T)

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, Win, Spr (Robertson, C)

OVERSEAS STUDIES COURSES IN BIOLOGY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUSTRALIA BIOLOGY COURSES

OSPAUSTL 10. Coral Reef Ecosystems
3 units, Aut (Hoegh-Guldberg, O; Ward, S; Arrigo, K)

OSPAUSTL 20. Coastal Resource Management
3 units, Aut (Johnstone, R)

OSPAUSTL 30. Coastal Forest Ecosystems
3 units, Aut (Hall, J)

SANTIAGO BIOLOGY COURSES

OSPSANTG 85. Marine Ecology of Chile and the South Pacific
5 units, Spr (Palma, A)

BIOLOGY, HOPKINS MARINE STATION (BIOHOPK) COURSES

For information on the Hopkins Marine Station, see the "Biology, Hopkins Marine Station" section of this bulletin.

UNDERGRADUATE COURSES IN BIOLOGY, HOPKINS MARINE STATION

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 56H. History and Philosophy of Science
The nature of scientific inquiry, its logic, historical patterns, and sociology. Emphasis is on the unique aspects of the biological sciences.
2 units, Spr (Somero, G), alternate years, not given next year

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. 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. 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. Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31, 135; calculus; or consent of instructor. GER:DB-NatSci

5 units, Spr (Gilly, W), 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 (Block, B; Thompson, S)

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. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

4 units, Win (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. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5 units, Win (Micheli, F)

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 (Denny, M; Gilly, W)

BIOHOPK 178H. Polar Biology
(Same as BIOHOPK 278H.) Seminar. Adaptation to extreme environments by Arctic and Antarctic organisms, from microbes to diving mammals. The effects of global change on polar environments. Prerequisite: Biology core or consent of instructor.

2 units, Spr (Somero, G), alternate years, not given next year

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; Micheli, F), 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 contributse to ongoing studies associated with Hopkins Marine Life Observatory. Training meets requirements for Stanford scientific diver certification. 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.

2 units, Win (Thompson, S)

BIOHOPK 188H. Experimental Sensory Ecology
(Same as BIOHOPK 288H. Graduate students register for 288H.) Experimental methods and findings related to animal sensory capability in the context of marine environments. Focus is on current literature and hands-on experiments. Laboratory component explores sensory mechanisms using neurobiological methods and and methods of experimental animal behavior. BIOHOPK 187H/287H is not a prerequisite. WIM

3 units, Spr (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.

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. Prerequisite: Biology core or consent of instructor. GER:DB-NatSci

5-8 units, given next year

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, 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. 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. 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. Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31.135; calculus; or consent of instructor.

5 units, Spr (Gilly, W), 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 (Block, B; Thompson, S)

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. Prerequisite: Biology core or consent of instructor.

4 units, Win (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. Prerequisite: Biology core or consent of instructor.

5 units, Win (Micheli, F)

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 organismal responses. Recommended: background in algology, intertidal ecology, or invertebrate zoology; basic physics and calculus.

4 units, Sum (Denny, M; Palumbi, S; Somero, G), not given next year

BIOHOPK 278H. Polar Biology
(Same as BIOHOPK 178H.) Seminar. Adaptation to extreme environments by Arctic and Antarctic organisms, from microbes to diving mammals. The effects of global change on polar environments. Prerequisite: Biology core or consent of instructor.

2 units, Spr (Somero, G), alternate years, not given next year

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 contributse to ongoing studies associated with Hopkins Marine Life Observatory. Training meets requirements for Stanford scientific diver certification. 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.

2 units, Win (Thompson, S)

BIOHOPK 288H. Experimental Sensory Ecology
(Same as BIOHOPK 188H. Graduate students register for 288H.) Experimental methods and findings related to animal sensory

capability in the context of marine environments. Current literature and hands-on experiments. Laboratory explores sensory mechanisms using neurobiological methods and and methods of experimental animal behavior. BIOHOPK 187H/287H is not a prerequisite.

3 units, Spr (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.

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); A. De Tomaso: Developmental and Comparative Immunology, Stem Cell Biology (evolution of self/non-self recognition systems); D. Epel: Developmental Biology (physiology and regulation of early embryonic development. Embryonic adaptation to environmental stress. W. Gilly: Neurobiology (analysis of giant axon systems in marine invertebrates from molecular to behavioral levels. 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 310H. Intertidal Natural History
Field-based. Local intertidal fauna and flora at Hopkins Marine Station. Students contribute to the development of a photographic key to the local organisms. May be repeated for credit.

2 units, Aut (Watanabe, J)

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; Micheli, F), 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. Prerequisite: Biology core or consent of instructor.

5-8 units, given next year

BIOHOPK 273H. Marine Conservation Biology
(Same as BIOHOPK 173H. Graduate students register for 273H.) The science of preserving marine diversity. 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, 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

For information on graduate programs in Biomedical Informatics, see the "Biomedical Informatics" section of this bulletin.

UNDERGRADUATE COURSES IN BIOMEDICAL INFORMATICS

BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution
(S,Sem Same as GENE 109Q.) Stanford Introductory Seminar. Preference to sophomores. For non-science majors. 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. Credit available only to students in a Biomedical Informatics degree program. 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. Credit available only to students in a Biomedical Informatics degree program. May be repeated three times for credit.

1 unit, Aut (Musen, M), Win (Musen, M), Spr (Musen, M)

BIOMEDIN 202. Introductory Biomedical Informatics
Via Internet. Current research problems and computational approaches to them. Topics include medical security and privacy, electronic medical records, controlled terminologies and biomedical ontologies, electronic retrieval, technology-assisted learning environments, medical decision making and support, sequence analysis, phylogenetics, biological networks and pathways, micro-array analysis, natural language processing, and protein structural analysis and prediction. Graduate students in the Biomedical Informatics training program may not take this class for credit.

1 unit, Aut (Fagan, L; Cheng, B), Win (Fagan, L; Cheng, B), Spr (Fagan, L; Cheng, B), Sum (Fagan, L; Cheng, B)

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 BIO 41, 42, 43, and 44X,Y or consent of instructor.

1 unit, Aut (Cheng, B; Fagan, L), Win (Cheng, B; Fagan, L), Spr (Cheng, B; Fagan, L), Sum (Cheng, B; Fagan, L)

BIOMEDIN 205. Biomedical Informatics for Medicine
Primarily for M.D. students; open to others. 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. May be repeated for credit. Prerequisite: background in biomedicine. Recommended: background in programming.

2 units, Aut (Butte, A), Spr (Butte, A)

BIOMEDIN 210. Introduction to Biomedical Informatics: Fundamental Methods
(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, Aut (Musen, M)

BIOMEDIN 211. Introduction to Biomedical Informatics: Principles of Systems Design
(Same as CS 271.) Focus is on undertaking design and implementation of computational and information systems for life scientists and healthcare providers. Case studies illustrate what design factors lead to success or failure in building systems in complex biomedical environments. Topics: requirements analysis, workflow and organizational factors, functional specification, knowledge modeling, data heterogeneity, component-based architectures, human-computer interaction, and system evaluation. Prerequisite: 210, or consent of instructor.

3 units, Win (Das, A)

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: 210, 211 or 214, or consent of instructor.

3 units, Aut (Altman, R; Cheng, B; Klein, T)

BIOMEDIN 214. Representations and Algorithms for Computational Molecular Biology
(Same as BIOE 214, CS 274, GENE 214.) Topics: algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, computing with networks of genes, 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, graphical display of biological data, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Spr (Altman, R)

BIOMEDIN 216. Lectures on Representations and Algorithms for Molecular Biology
Lecture series for BIOMEDIN 214. Recommended: familiarity with biology.

1 unit, Spr (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, Win (Butte, A)

BIOMEDIN 218. Translational Bioinformatics
Same content as 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, Win (Butte, A)

BIOMEDIN 228. Computational Genomic Biology
(Same as BIOC 228.) Application of computational genomics methods to biological problems. Topics include: assembly of genomic sequences; genome databases; comparative genomics; gene discovery; gene expression analyses including gene clustering by expression, transcription factor binding site discovery, metabolic pathway discovery, functional genomics, and gene and genome ontologies; and medical diagnostics using SNPs and gene expression. Recent papers from the literature and hands-on use of the methods. Prerequisites: introductory course in computational molecular biology or genomics such as BIOC 218, BIOMEDIN 214 or GENE 211.

3 units, Win (Brutlag, D)

BIOMEDIN 231. Computational Molecular Biology
(Same as BIOC 218.) Via Internet. 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 BIO 41 or consent of instructor.

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, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference.

3 units, Win (Sainani, K)

BIOMEDIN 238. Computational Proteomic Biology
(Same as BIOC 238.) Application of computational protein analysis to biological problems. Topics include: protein sequence analysis and comparison including protein sequence databases, amino acid composition, protein alignment, protein motifs, protein families, and probabilistic models of families; protein structure including structure comparison and superposition methods, structural motifs, and structure and domain databases; protein structure prediction including secondary structure, homology modeling, threading, and ab initio structure prediction; protein-protein interaction databases and protein-protein interaction prediction; and protein-DNA interaction motifs and protein-ligand docking. Prerequisite:

introductory course in computational biology such as BIOC 218, BIOMEDIN 214, or SBIO/BIOPHYS 228. Via Internet in Spring.

3 units, not given this year

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.) Computational biology through an exploration of human genome. Key genetic concepts from a bioinformatics perspective. Biomedical advances resulting from sequencing of human and related organisms. Genome sequencing: technologies, assembly, personalized sequencing. Functional landscape: genes, regulatory modules, repeats, RNA genes. Genome evolution: processes, comparative genomics, ultraconservation, co-option. Additional topics: population genetics and personalized genomics, ancient DNA, and metagenomics.

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.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

BIOMEDIN 301. Special Topics in Biomedical Informatics

1-6 units, Sum (Staff)

BIOMEDIN 303. Statistics for Research
Statistical methods commonly used in research. Emphasis is on when and how to use the methods rather than on proofs. How to describe data and detect unusual values, compare treatment effects, interpret p-values, detect and quantify trends, detect and measure association and correlation, determine the sample size and power for an experiment, and choose statistical tests and software. Topics include descriptive statistics (mean, median, standard deviation, standard error), probability, paired and unpaired t-tests, analysis of variance, correlation, regression, chi-square, discriminant analysis, and power and sample size. Statistical analysis software including Excel and Statistica. (M. Walker)

1 unit, not given this year

BIOMEDIN 366. Computational Biology
(Same as STATS 166, STATS 366.) Methods to understand sequence alignments and phylogenetic trees built from molecular data, and general genetic data. Phylogenetic trees, median networks, microarray analysis, Bayesian statistics. Binary labeled trees as combinatorial objects, graphs, and networks. Distances between trees. Multivariate methods (PCA, CA, multidimensional scaling). Combining data, nonparametric inference. Algorithms used: branch and bound, dynamic programming, Markov chain approach to combinatorial optimization (simulated annealing, Markov chain Monte Carlo, approximate counting, exact tests). Software such as Matlab, Phylip, Seq-gen, Arlequin, Puzzle, Splitstree, XGobi.

2-3 units, Spr (Wong, W)

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, Spr (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. (Musen)

1 unit, Aut (Staff), 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. (Musen)

1 unit, Aut (Staff), 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. (Musen)

1 unit, Aut (Staff), Win (Staff), Spr (Musen, M), Sum (Musen, M)

BIOMEDIN 432. Analysis of Costs, Risks, and Benefits of Health Care
(Same as MGTECON 332, HRP 392.) For graduate students. The principal evaluative techniques for health care, including utility assessment, cost-effectiveness analysis, cost-benefit analysis, and decision analysis. Emphasis is on the practical application of these techniques. Group project presented at end of quarter. Guest lectures by experts from the medical school, pharmaceutical industry, health care plans, and government.

4 units, Aut (Garber, A; Owens, D)

BIOPHYSICS (BIOPHYS) COURSES

For information on undergraduate and graduate programs in the Department of Biophysics, see the "Biophysics" section of this bulletin.

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. Recommended: neuroscience.

3 units, not given this year

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, Aut (Levitt, M), Spr (Levitt, M)

BIOPHYS 232. Advanced Imaging Lab in Biophysics
(Same as 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; Schnitzer, M; 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, 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. Prerequisites: introductory biochemistry and physical chemistry or consent of instructor.

3-5 units, Aut (Herschlag, D; Puglisi, J; Garcia, K; Ferrell, J; Block, S; Weis, W)

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 (Weis, W; Puglisi, J), alternate years, not given next year

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. (W. Weiss)

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, alternate years, 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)

CATALAN LANGUAGE (CATLANG) COURSES

Because the Catalan Language Program does not have a formal placement test, students registering for the first time must see the coordinator for proper placement if they have had any prior training in Catalan. Completion of CATLANG 2A fulfills the University Foreign Language Requirement. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN CATALAN LANGUAGE

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 (Sanjuan-Pastor, M)

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 (Sanjuan-Pastor, M)

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 (Sanjuan-Pastor, M)

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)

CANCER BIOLOGY (CBIO) COURSES

For information on graduate programs in Cancer Biology, see the "Cancer Biology" section of this bulletin. Course and laboratory instruction in the Cancer Biology Program conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN CANCER BIOLOGY

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. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor.
4 units, Spr (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 of 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; Chua, K; Graves, E)

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 (Giaccia, A), Spr (Lipsick, J)

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)

CENTER FOR TEACHING AND LEARNING (CTL) COURSES

For information on the Center for Teaching and Learning, see the "Center for Teaching and Learning" section of this bulletin.

UNDERGRADUATE COURSES IN CENTER FOR TEACHING AND LEARNING

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 56. Building a Successful Academic Career
For freshmen in expanded advising programs. Techniques for honing academic skills for college, and applying those skills to better define intellectual identity in academic pursuits. May be repeated for credit.
1 unit, Aut (Williams, R), Win (Williams, R)

CTL 60. Investigating Stanford's Treasures
(Same as CTL 160.) Private tours of some of Stanford's greatest resources led by Stanford experts; students interview the experts and introduce them to the class at the site. One hour of class discussion per week. Tours may include Jasper Ridge Biological Reserve, Memorial Church, Special Collections, and the Martin Luther King, Jr., Papers Project.
1-2 units, Aut (Moser, J)

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 116A. The Language of Film Noir: From Bogart to Pulp Fiction
The quintessential American film genre which combined femmes fatales, anti-heroes, lost dreams, violence, and a distinct style of expression. Film viewings, student oral presentations, and analyses of films.
1-2 units, alternate years, not given this year

CTL 116B. Classic American Comic Film: from Chaplin to Present
A sampling of American comic masterpieces including silent movies, 30s screwball films, and works by Billy Wilder, Woody Allen, and contemporary film makers. Film viewings, student oral presentations, and analyses of films.
1-2 units, Win (Moser, J)

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; Hennings, J)

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. Performative link between writing and speech. 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 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 160. Investigating Stanford's Treasures
(Same as CTL 60.) Private tours of some of Stanford's greatest resources led by Stanford experts; students interview the experts and introduce them to the class at the site. One hour of class discussion per week. Tours may include Jasper Ridge Biological Reserve, Memorial Church, Special Collections, and the Martin Luther King, Jr., Papers Project.
1-2 units, Aut (Moser, J)

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 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. College Teaching in the Humanities
For graduate students in the humanities interested in an academic career. Topics include latest research on teaching and learning, effective humanities teaching practices, designing courses and assignments, writing a teaching statement, disciplinary and interdisciplinary teaching, teaching with technology, and research on early career faculty.
1-3 units, Win (Denman, M)

CTL 227. Fundamentals of Teaching in the Social Sciences
Topics include leading discussions, small group work, active learning techniques, lecturing, giving and getting feedback, class organization, and communication with students and faculty.
1-2 units, Aut (Clerici-Arias, 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, Aut (Staff)

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 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, GES 201.) 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)

CTL 400. Future Faculty Seminar
Weekly speaker and workshop series with discipline-specific sections for graduate students considering a faculty career in higher education. Scope includes tenure, grant writing, teaching, service, getting hired, and other non-research aspects of the profession. What professors do.
1 unit, Aut (Staff)

CHEMICAL ENGINEERING (CHEMENG) COURSES

For information on undergraduate and graduate programs in the Department of Chemical Engineering, see the "Chemical Engineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN CHEMICAL ENGINEERING

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, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. GER:DB-EngrAppSci
3 units, Spr (Hwang, L)

CHEMENG 25. Biotechnology
(Same as ENGR 25.) Interplay among biology, technology, and society. Topics include biological fundamentals, genetic engineering, protein production, pharmaceuticals, antibodies, plant biotechnology, vaccines, transgenic animals, and stem cells. The role of intellectual property, business, government regulations, and ethics in biotechnology. GER:DB-EngrAppSci
3 units, Spr (Wang, C)

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.
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 (Hwang, L)

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. Microelectronics Processing Technology
(Same as CHEMENG 240.) Microelectronics processing technologies in industrial sectors such as semiconductor, biotechnology, and energy. The chemistry and transport of microelectronics device fabrication. Solid state materials and electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, metallization, plasma processing. Micropatterning involving photolithography and nanopatterning using unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55.
3 units, Spr (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 BIO 41 or equivalent.
3 units, Aut (Hwang, L)

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, Win (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 BIO 41, CHEMENG 181 (formerly 188), or equivalents.

3 units, Aut (Krieger, C), Sum (Staff)

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. Prerequisites: CHEM 135 or 171. GER:DB-NatSci

3 units, Win (Zare, R; Altman, D)

CHEMENG 183. Biochemistry II
(Same as BIO 189, BIO 289, CHEMENG 283, CHEM 183. CHEMENG offerings formerly listed as 189/289.) Metabolism. Glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, protein degradation and amino acid catabolism, protein translation and amino acid biosynthesis, nucleotide biosynthesis, DNA replication, recombination and repair, lipid and steroid biosynthesis. Medical consequences of impaired metabolism. Therapeutic intervention of metabolism. 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. WIM

4 units, Aut (Bent, S)

CHEMENG 185B. Chemical Engineering Laboratory B
Methods and techniques of biochemical engineering. Emphasis is on team organization, communication skills, experimental design, and project execution. Presentations, experiments, and demonstrations of biotechnology designed for high school students. Prerequisite: BIO 41, CHEMENG 181 (formerly 188), or equivalent.

2-4 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 department approved Chemical Engineering B.S. with honors majors who have obtained faculty approval for a research proposal. Research for at least 3 quarters, concluding thesis, and oral presentation of work. 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 honors research. 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. Microelectronics Processing Technology
(Same as CHEMENG 140.) Microelectronics processing technologies in industrial sectors such as semiconductor, biotechnology, and energy. The chemistry and transport of microelectronics device fabrication. Solid state materials and electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, metallization, plasma processing. Micropatterning involving photolithography and nanopatterning using unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55.

3 units, Spr (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, Win (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 BIO 41, CHEMENG 181 (formerly 188), or equivalents.

3 units, Aut (Krieger, C), Sum (Staff)

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. Prerequisites: CHEM 135 or 171.

3 units, Win (Zare, R; Altman, D)

CHEMENG 283. Biochemistry II
(Same as BIO 189, BIO 289, CHEMENG 183, CHEM 183. CHEMENG offerings formerly listed as 189/289.) Metabolism. Glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, protein degradation and amino acid catabolism, protein translation and amino acid biosynthesis, nucleotide biosynthesis, DNA replication, recombination and repair, lipid and steroid biosynthesis. Medical consequences of impaired metabolism. Therapeutic intervention of metabolism. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

3 units, Spr (Dunn, A)

CHEMENG 300. Applied Mathematics in the Chemical and Biological Sciences
(Same as CME 330.) Mathematical solution methods via applied problems including chemical reaction sequences, mass and heat transfer in chemical reactors, quantum mechanics, fluid mechanics of reacting systems, and chromatography. Topics include generalized vector space theory, linear operator theory with eigenvalue methods, phase plane methods, perturbation theory (regular and singular), solution of parabolic and elliptic partial differential equations, and transform methods (Laplace and Fourier). Prerequisites: CME 102/ENGR 155A and CME 104/ENGR 155B, or equivalents.

3 units, Aut (Shaqfeh, E)

CHEMENG 310. Microscale Transport in Chemical Engineering
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, Win (Fuller, G)

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 BIO 41, or equivalent.

3 units, Spr (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 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 this year

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), alternate years, not given next year

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, Aut (Wang, C)

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, C)

CHEMENG 460. Polymer Surfaces and Interfaces
Principles of interfacial thermodynamics and polymer physics applied to polymer surfaces and interfaces. Treatments of intermolecular forces; conformational statistics of macromolecular structure; models for polymer dynamics; tethering of polymers at different interfaces; techniques for chemical modification of surfaces; methods for physical characterization of polymer surfaces and interfaces. Applications in adhesion and biocompatibility. Prerequisite: exposure to principles of polymer science or consent of instructor.

3 units, alternate years, not given this 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, Win (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), alternate years, not given next 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 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 (Jaramillo, T), Win (Jaramillo, T), Spr (Jaramillo, T)

CHEMICAL AND SYSTEMS BIOLOGY (CSB) COURSES

For information on graduate programs in the Department of Chemical and Systems Biology, see the "Chemical Systems Biology" section of this bulletin. Course and laboratory instruction in the Department of Chemical and Systems Biology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN CHEMICAL AND SYSTEMS BIOLOGY

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 AND 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, Win (Ferrell, J; Meyer, T)

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; Herschlag, D; Chen, J), 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.

3 units, 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, Aut (Cimprich, K; Wysocka, J)

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, Spr (Staff), 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 278. Systems Biology
(Same as BIOC 278, BIOE 310, CS 278.) 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.

3 units, Aut (Covert, M; Dill, D; Brutlag, D; 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 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)

CHEMISTRY (CHEM) COURSES

For information on undergraduate and graduate programs in the Department of Chemistry, see the "Chemistry" section of this bulletin. Lab fees are a minimum of $75 per quarter and are not refundable.

UNDERGRADUATE COURSES IN CHEMISTRY

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.

2 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. 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.

2 units, Win (Djerassi, C)

CHEM 27N. Lasers: The Light Fantastic
Preference to freshmen. Introduction to lasers and their impact on everyday life. The operation of lasers using concepts of atomic and molecular energy levels, optics, and resonance. The use of lasers to produce guide stars for astronomy, sculpt the cornea, measure molecules in the ozone layer, transmit optical information over the web, measure the distance to the moon, and observe a single protein molecule in action. Prerequisites: CHEM 31A or X, or PHYSICS 23 and 25, or equivalents. GER:DB-NatSci

3 units, not given this year

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 (Chidsey, C; Dai, H), Sum (Jacobs, R)

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 (Andersen, H), Sum (Jacobs, R)

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; Du Bois, J), Spr (Staff), Sum (Kahl, S)

CHEM 35. Organic Monofunctional Compounds
Organic chemistry of oxygen and nitrogen aliphatic compounds. Recitation. Prerequisite: 33. GER:DB-NatSci

4 units, Aut (Huestis, W), Spr (Flygare, 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 (Moylan, C), Spr (Hua, Y), Sum (Moylan, C)

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 (Cui, B)

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 (Kool, E), Win (Trost, B)

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 (Moylan, 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 (Pecora, R)

CHEM 136. Synthesis Laboratory
Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 35, 130. GER:DB-NatSci
3 units, Win (Yandulov, D)

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 (Pande, V)

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 (Moylan, 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. Prerequisites: CHEM 135 or 171. GER:DB-NatSci
3 units, Win (Zare, R; Altman, D)

CHEM 183. Biochemistry II
(Same as BIO 189, BIO 289, CHEMENG 183, CHEMENG 283. CHEMENG offerings formerly listed as 189/289.) Metabolism. Glycolysis, gluconeogenesis, citric acid cycle, oxidative phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, protein degradation and amino acid catabolism, protein translation and amino acid biosynthesis, nucleotide biosynthesis, DNA replication, recombination and repair, lipid and steroid biosynthesis. Medical consequences of impaired metabolism. Therapeutic intervention of metabolism. 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: 188. GER:DB-NatSci
4 units, Spr (Elrad, D; Kool, E; Zare, R)

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 (Du Bois, J)

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. Topics in Organic Chemistry
Possible topics: synthetic organic chemistry, photochemistry, inorganic-organic chemistry, bio-organic chemistry, reaction mechanisms, stereochemistry, structural chemistry of organic and biological molecules. May be repeated for credit.
3 units, Aut (Du Bois, J)

CHEM 229. Organic Chemistry Seminar
Required of graduate students majoring in organic chemistry. Students giving seminars register for 231.
1 unit, Aut (Kool, E), Win (Kool, E), Spr (Kool, E)

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.
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.
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.
1 unit, Spr (Waymouth, R)

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, Win (Chidsey, C)

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, Win (Solomon, E)

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. A: Win, B: Spr, C: Aut.
1 unit, Win (Yandulov, D)

CHEM 258B. Research Progress in Inorganic Chemistry
Required of 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. A: Win, B: Spr, C: Aut, Win
1 unit, Spr (Yandulov, D)

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. A: Win, B: Win, C: Aut, Win
1 unit, Aut (Yandulov, D), Win (Yandulov, D)

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: vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wave functions and energy levels of rigid rotations, vibration-rotation interaction), ab initio electronic structure theory (Hartree-Fock, configuration interaction, multi-configuration self-consistent-field, and many-body perturbation theory techniques), angular momentum theory (operators and wave functions, Clebsch-Gordan coefficients, rotation matrices), time-dependent quantum mechanics (time evolution operator, Feynman path integrals, scattering theory, Born approximation, Lipmann-Schwinger equation, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules). Prerequisite: 271 or Physics 230.
3 units, Win (Dai, H)

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 (Pande, V)

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, Aut (Pecora, R)

CHEM 278A. Research Progress in Physical Chemistry
Required of 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 written and oral summaries (A); third-year students prepare a written progress report (B).
1 unit, Win (Pecora, R)

CHEM 278B. Research Progress in Physical Chemistry
Required of 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 written and oral summaries (A); third-year students prepare a written progress report (B).
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 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, alternate years, 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 (Moylan, C), Win (Moylan, C), Spr (Moylan, C)

CHEM 300. Department Colloquium
Required of graduate students. May be repeated for credit.
1 unit, Aut (Du Bois, J), Win (Du Bois, J), Spr (Du Bois, J)

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, Sum (Zare, R)

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, Win, Spr (Robertson, C)

CHICANA/O STUDIES (CHICANST) COURSES

For information on undergraduate programs in Chicana/o Studies, see the "Comparative Studies in Race and Ethnicity" section of this bulletin.

UNDERGRADUATE COURSES IN CHICANA/O STUDIES

CHICANST 121C. Chicana/o Film Practices
(Same as CSRE 121C.) The ideological parameters of Chicanismo, including migration, labor, organized state violence, collectivism, familialism, spirtual practices, gender, and sexual politics. The cultural, aesthetic, and political dimensions of film form, including formal and textual analysis.
5 units, not given this year

CHICANST 121R. Redefining the Nation: Chicana/o Literature and Art From the 1960s to the Present
(Same as CSRE 121R.) Topics include categories of national identity construction and identity performance such as the body, family, and community. Borderlands as a transnational concept emphasizing links between the U.S. and other regions of the continent.
5 units, Win (Staff)

CHICANST 122. Introduction to Latina Literature
(Same as CSRE 122.) Interdisciplinary. Intracultural differences amongst Latinas such as around immigration. Themes include gender, sexuality, identity, language politics, transnationalism, socioeonomic status, and the notion of homeland and its loss and reclamation.
3-5 units, Spr (Staff)

CHICANST 165A. Chicana/o History
(Same as CSRE 165A, HISTORY 264X.) The history of Mexican-origin people in the U.S. from 1848 to the present. Mexican American experiences as integral to American history. Tthemes include the effects of conquest, patterns of migration, labor and the formation of social classes, racialization, gender roles, ideology, and political activism.
5 units, Aut (Staff)

CHICANST 187C. Latino Children: Cultural and Social Contexts of Development
(Same as CSRE 187C.) Ecological contexts, including family, school, and society, that shape the psychosocial and educational outcomes of Latino children. Sources include developmental and cultural psychology, anthropology of education, and sociology. (Borsato)
5 units, not given this year

CHICANST 189W. Language and Minority Rights
(Same as CSRE 189W.) 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.
3 units, Win (Staff)

CHICANST 200R. Directed Research
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

CHICANST 200W. Directed Reading
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)

CHINESE GENERAL (CHINGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of an Asian language. Students interested in literature and literary studies should also consult course listings in Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For possible future offerings, see http://www.stanford.edu/dept/asianlang/courses/. For information on undergraduate and graduate programs in Chinese and other programs in the Department of Asian Languages, see the "Asian Languages" section of this bulletin. For courses in Chinese language instruction, see "Chinese Language Courses" section of this bulletin.

UNDERGRADUATE COURSES IN CHINESE GENERAL

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 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, Win (Lee, H)

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, Win (Zhou, Y)

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, Win (Zhou, Y)

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, Aut (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, Win (Wang, J)

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, Win (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 135. Chinese Bodies, Chinese Selves
(Same as CHINGEN 235.) Interdisciplinary. The body as a contested site of representational practices, identity politics, cultural values, and social norms. Body images, inscriptions, and practices in relation to health, morality, gender, sexuality, nationalism, consumerism, and global capitalism in China and Taiwan. Sources include anthropological, literary, and historical studies, and fiction and film. No knowledge of Chinese required.

3-5 units, Spr (Staff)

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, not given this year

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:EC-GlobalCom

3-5 units, Spr (Lee, H)

CHINGEN 138. Passion and Love in Chinese Film
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, Spr (Wang, B)

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

GRADUATE COURSES IN CHINESE GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHINGEN 200. Directed Readings in Asian Languages
For Chinese literature. Prerequisite: consent of instructor.

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 (Lee, H)

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, Win (Zhou, Y)

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, Win (Zhou, Y)

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, Aut (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, Win (Wang, J)

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.
4-5 units, Win (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 235. Chinese Bodies, Chinese Selves
(Same as CHINGEN 135.) Interdisciplinary. The body as a contested site of representational practices, identity politics, cultural values, and social norms. Body images, inscriptions, and practices in relation to health, morality, gender, sexuality, nationalism, consumerism, and global capitalism in China and Taiwan. Sources include anthropological, literary, and historical studies, and fiction and film. No knowledge of Chinese required.
3-5 units, Spr (Staff)

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, not given this year

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, Spr (Lee, H)

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

CHINESE LANGUAGE (CHINLANG) COURSES

Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Chinese before entering Stanford. All entering students must take Part I (written) of the placement test online during the summer, followed by Part II (oral), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN CHINESE LANGUAGE

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. 1: Aut, 2: Win, 3: Spr
5 units, Aut (Zeng, H)

CHINLANG 1B. First-Year Modern Chinese for Bilingual Students, First Quarter
For students with elementary comprehension and speaking skills to work on conversation, grammar, reading, and composition.
3 units, Aut (Rozelle, Y)

CHINLANG 2. First-Year Modern Chinese, Second Quarter
Conversation, grammar, reading, elementary composition. 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
For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition.
3 units, Win (Rozelle, Y)

CHINLANG 3. First-Year Modern Chinese, Third Quarter
Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.
5 units, Spr (Zeng, H)

CHINLANG 3B. First-Year Modern Chinese for Bilingual Students, Third Quarter
For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition.
3 units, Spr (Rozelle, Y)

CHINLANG 5. Intensive First-Year Modern Chinese
Equivalent to 1,2,3 combined. Five weeks at Stanford and four weeks at Peking University.
7-8 units, Sum (Zeng, H)

CHINLANG 6. Beginning Conversational Chinese, First Quarter
Three quarter sequence. Language skills in Mandarin to function abroad.
2 units, Aut (Rozelle, Y)

CHINLANG 7. Beginning Conversational Chinese, Second Quarter
Three quarter sequence. Language skills in Mandarin to function abroad.
2 units, Win (Rozelle, Y)

CHINLANG 8. Beginning Conversational Chinese, Third Quarter
Three quarter sequence. Language skills in Mandarin to function abroad.
2 units, Spr (Rozelle, Y)

CHINLANG 10. Beginning Southern Min (Taiwanese) Conversation, First Quarter
Three quarter sequence. Language skills for everyday life situations.
2 units, Aut (Lin, N)

CHINLANG 11. Beginning Southern Min (Taiwanese) Conversation, Second Quarter
Three quarter sequence. Language skills for everyday life situations.
1-2 units, Win (Lin, N)

CHINLANG 12. Beginning Southern Min (Taiwanese) Conversation, Third Quarter
Three quarter sequence. Language skills for everyday life situations.
2 units, Spr (Lin, N)

CHINLANG 13A. Intermediate Southern Min (Taiwanese) Conversation, First Quarter
Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: 12 or consent of instructor.
2 units, Aut (Lin, N)

CHINLANG 13B. Intermediate Southern Min (Taiwanese) Conversation, Second Quarter
Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: 12 or consent of instructor.
2 units, Win (Lin, N)

CHINLANG 13C. Intermediate Southern Min (Taiwanese) Conversation, Third Quarter
Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: 12 or consent of instructor.
2 units, not given this year

CHINLANG 15. Beginning Conversational Cantonese, First Quarter
Three quarter sequence. Basic language skills for everyday life situations and for functioning abroad.
2 units, Aut (Dennig, S)

CHINLANG 15M. Beginning Conversational Cantonese for Mandarin Speakers, First Quarter
Conversational skills and special written characters in Cantonese.
2 units, Aut (Dennig, S)

CHINLANG 16. Beginning Cantonese Conversation, Second Quarter
Three quarter sequence. Basic language skills for everyday life situations and for functioning abroad.
2 units, Win (Dennig, S)

CHINLANG 16M. Beginning Conversational Cantonese for Mandarin Speakers, Second Quarter
For Mandarin speakers and advanced Mandarin learners. Conversational skills and special written characters in Cantonese.
2 units, Win (Dennig, S)

CHINLANG 17. Beginning Conversational Cantonese, Third Quarter
Three quarter sequence. Basic language skills for everyday life situations and for functioning abroad.
2 units, Spr (Dennig, S)

CHINLANG 17M. Beginning Conversational Cantonese for Mandarin Speakers, Third Quarter
For Mandarin speakers and advanced Mandarin learners. Conversational skills and special written characters in Cantonese.
2 units, Spr (Dennig, S)

CHINLANG 18. Intermediate Cantonese Conversation, First Quarter.
2 units, Aut (Dennig, S)

CHINLANG 19. Intermediate Conversational Cantonese, Second Quarter
Continuation of CHINLANG 17 or 17M. Building vocabulary and grammar while learning about Cantonese culture, Chinese American history, and current events and topics.
2 units, Win (Dennig, S)

CHINLANG 20. Intermediate Conversational Cantonese, Third Quarter
Continuation of CHINLANG 17 or 17M. Building vocabulary and grammar while learning about Cantonese culture, Chinese American history, and current events and topics.
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 CHINLANG 20 or consent of instructor.
2 units, Aut (Dennig, S)

CHINLANG 20B. Advanced Conversational Cantonese, Second Quartet
Viewing and discussion of authentic multimedia materials on cultural topics and current events: movies, video clips, radio, TV broadcasts, and Internet tools. Prerequisite CHINLANG 20 or consent of instructor.
2 units, Win (Dennig, S)

CHINLANG 20C. Advanced Cantonese Conversation
Improving Cantonese through Hong Kong movies.
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.
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.
3 units, Aut (Zhu, Q)

CHINLANG 22. Second-Year Modern Chinese, Second Quarter
Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: 3 or equivalent.
5 units, Win (Chung, M)

CHINLANG 22B. Second-Year Chinese for Bilingual Students, Second 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.
3 units, Win (Zhu, Q)

CHINLANG 23. Second-Year Modern Chinese, Third Quarter
Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: 3 or equivalent.
5 units, Spr (Chung, M)

CHINLANG 23B. Second-Year Chinese for Bilingual Students, Third 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.
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
5 units, not given this year

CHINLANG 24C. Second-Year Comprehensive Cantonese, Third Quarter
5 units, not given this year

CHINLANG 25. Intensive Second-Year Modern Chinese
Equivalent to 21,22,23 combined. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 3 or equivalent.
7-8 units, Sum (Chung, M)

CHINLANG 27. Intermediate Chinese Conversation, First Quarter
Prerequisite: 3 or consent of instructor. 27: Aut, 28: Win 29: Spr
2 units, Aut (Zhang, Y)

CHINLANG 28. Intermediate Chinese Conversation, Second Quarter
Prerequisite: 3 or consent of instructor. 27: Aut, 28: Win 29: Spr
2 units, Win (Zhang, Y)

CHINLANG 29. Intermediate Chinese Conversation, Third Quarter
Prerequisite: 3 or consent of instructor.
1-2 units, Spr (Zhang, Y)

CHINLANG 99. Language Specials
Prerequisite: consent of instructor.
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.
5 units, Aut (Zhang, X)

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 101,102,103. 101B: Aut, 102B: Win, 103B: Spr
3 units, Aut (Wang, H)

CHINLANG 102. Third-Year Modern Chinese, Second Quarter
Goal is to further communicative ability in Chinese through contact with 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.
5 units, Win (Zhang, X)

CHINLANG 102B. Third-Year Modern Chinese for Bilingual Students, Second Quarter
For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Equivalent of 101,102,103.
3 units, Win (Wang, H)

CHINLANG 103. Third-Year Modern Chinese, Third 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.
5 units, Spr (Wang, H)

CHINLANG 103B. Third-Year Modern Chinese for Bilingual Students, Third Quarter
For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Equivalent of 101,102,103.
3 units, Spr (Wang, H)

CHINLANG 105. Intensive Third-Year Modern Chinese
Equivalent to 101,102,103 combined. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent.
7-8 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: 23 or equivalent.
2 units, Win (Chung, M)

CHINLANG 123. Advanced Chinese Conversation, Third Quarter
Prerequisite: 23 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
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, Win (Wang, H)

CHINLANG 133. Business Chinese, Third 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, 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. Prerequisite: three years of Chinese.
2-5 units, Aut (Zhu, Q)

CHINLANG 212. Fourth-Year Modern Chinese, Second 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. Prerequisite: three years of Chinese.
2-5 units, Win (Zhu, Q)

CHINLANG 213. Fourth-Year Modern Chinese, Third 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. Prerequisite: three years of Chinese.
2-5 units, Spr (Zhu, Q)

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.
3 units, not given this year

CHINLANG 222. Fourth-Year Modern Chinese for Social Science Students, Second 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.
3 units, not given this year

CHINLANG 223. Fourth-Year Modern Chinese for Social Science Students, Third 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.
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 (Zhu, Q)

CHINLANG 232. Fifth-Year Modern Chinese: Cultural China, Second Quarter
Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions.
2-5 units, Win (Zhu, Q)

CHINLANG 233. Fifth-Year Modern Chinese: Cultural China, Third Quarter
Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions.
2-5 units, Spr (Zhu, Q)

GRADUATE COURSES IN CHINESE LANGUAGE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CHINLANG 31E. Accelerated Beginning Mandarin for Engineering Students, First Quarter
Restricted to engineering students participating in the China Internship Program.
2-5 units, Spr (DiBello, M)

CHINLANG 31G. Accelerated Beginning Mandarin I
For GSB students only. (Chung)
4 units, Aut (DiBello, M)

CHINLANG 32G. Accelerated Beginning Mandarin II
For GSB students only. (Chung)
4 units, Win (DiBello, M)

CHINLANG 33G. Accelerated Beginning Mandarin III
For GSB students only.
4 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)

OVERSEAS STUDIES COURSES IN CHINESE LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING CHINESE LANGUAGE COURSES

OSPBEIJ 3C. First-Year Modern Chinese
5 units, Spr (Staff)

OSPBEIJ 21C. Second-Year Modern Chinese
5 units, Aut (Staff)

OSPBEIJ 23C. Second-Year Modern Chinese
5 units, Spr (Staff)

OSPBEIJ 101C. Third-Year Modern Chinese
5 units, Aut (Staff)

OSPBEIJ 103C. Third-Year Modern Chinese
5 units, Spr (Staff)

OSPBEIJ 211C. Fourth-Year Modern Chinese
5 units, Aut (Staff)

CHINESE LITERATURE (CHINLIT) COURSES

These courses typically require knowledge of Chinese. Students interested in literature and literary studies should also consult course listings in Classics, Comparative Literature, English, French, German Studies, Italian, Slavic Languages and Literatures, and Spanish and Portuguese, and in Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For possible future offerings, see http://www.stanford.edu/dept/asianlang/courses/. For information on undergraduate and graduate programs in Chinese and other programs in the Department of Asian Languages, see the "Asian Languages" section of this bulletin. For courses in Chinese language instruction, see "Chinese Language Courses" section of this bulletin.

UNDERGRADUATE COURSES IN CHINESE LITERATURE

CHINLIT 125. Beginning Classical Chinese, First Quarter
(Same as CHINLIT 205.) Goal is reading knowledge of classical Chinese. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Basic grammar and commonly used vocabulary. Prerequisite: CHINLANG 23 or equivalent. 125: Aut, 126: Win, 127: Spr
2-5 units, Aut (Sun, C)

CHINLIT 126. Beginning Classical Chinese, Second Quarter
(Same as CHINLIT 206.) Goal is reading knowledge of classical Chinese. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Basic grammar and commonly used vocabulary. 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. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Basic grammar and commonly used vocabulary. Prerequisite: CHINLANG 126/206 or equivalent.
2-5 units, Spr (Zhou, Y)

CHINLIT 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)

CHINLIT 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)

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

For graduate students only.

CHINLIT 200. Directed Reading in Chinese
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CHINLIT 205. Beginning Classical Chinese, First Quarter
(Same as CHINLIT 125.) Goal is reading knowledge of classical Chinese. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Basic grammar and commonly used vocabulary. Prerequisite: CHINLANG 23 or equivalent. 125: Aut, 126: Win, 127: Spr
2-5 units, Aut (Sun, C)

CHINLIT 206. Beginning Classical Chinese, Second Quarter
(Same as CHINLIT 126.) Goal is reading knowledge of classical Chinese. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Basic grammar and commonly used vocabulary. 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. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Basic grammar and commonly used vocabulary. Prerequisite: CHINLANG 126/206 or equivalent.
2-5 units, Spr (Zhou, Y)

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, Spr (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 251. China and the World: Aesthetics, Ethics, and Literature
(Same as COMPLIT 242A.) How 20th-century Chinese thinkers and

writers envisioned themselves as citizens of the world and critiqued traditional culture. How intellectuals infused new life into traditional thought and sensibility and made contributions to global culture. The matrix of aesthetics, ethics, and literature. Texts from the Western aesthetic and cosmopolitan tradition.

4-5 units, Aut (Wang, B)

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, Win (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, Win (Wang, J)

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.

2-5 units, Spr (Wang, J)

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

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 371. Seminar in Chinese Literary Criticism
Chinese critical texts in relation to Western literary theories. May be repeated for credit. Prerequisite: 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.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE) COURSES

For information on undergraduate and graduate programs in the Department of Civil and Environmental Engineering, see the "Civil and Environmental Engineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING

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), Spr (Barton, J)

CEE 46Q. Fail Your Way to Success
Stanford Introductory Seminar. Preference to sophomores. How to turn failures into successes; cases include minor personal failures and devastating engineering disasters. How personalities and willingness to take risks influence the way students approach problems. Field trips, case studies, and guest speakers applied to students day-to-day interactions and future careers. Goal is to redefine what it means to fail. GER:DB-EngrAppSci

3 units, Spr (Clough, R)

CEE 48N. Organizing Global Projects
Stanford Introductory Seminar. Preference to freshmen. Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Students teams model and simulate crosscultural 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.

4 units, Aut (Levitt, R)

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, Spr (Kopperud, R; Walton, K; Strickfaden, R)

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; Liu, X)

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 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, Aut (Haymaker, J)

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 (Lin, M), Win (Staff), Spr (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 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 (Staff)

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, Aut (Flager, F)

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 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. GER:DB-EngrAppSci

4 units, not given this year

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
Studio design project focus is on a building of intermediate complexity, focusing on how design meets the requirements of economy, ecology and society. Taught by guest architects. May be repeated once for credit. Prerequisites: CEE 31 or 31Q, and CEE 110 and 130.

5 units, Win (Staff)

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, Aut (Johnson, M)

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 (Barton, J)

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, Spr (Redd, T)

CEE 142A. Creating Sustainable Development
(Same as CEE 242A.) How the built environment influences the way people interact with each other in communities. Case studies. How tradeoffs among economic, ecological, and social benefits can be managed. Frameworks for managing stakeholder processes including negotiating multiparty processes. Group project. Enrollment limited to 50.

3 units, Win (Christensen, S)

CEE 143. Integrated Concurrent Engineering
(Same as CEE 243.) Computer-based models in building design and construction. Virtual design and construction (VDC): the use of multidisciplinary performance models of design-construction projects, including the product (facilities), work processes, organization of the design-construction-operation team, and economic impact (model of both cost and value of capital investments) to support business objectives. Opportunity for 4-day mini-internship at an A/E/C company over Spring break. Prerequisite for undergraduates: 100 or consent of instructor. Recommended for graduate students: 241, 242.

3-4 units, not given this year

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 (Clough, R)

CEE 151. Negotiation
(Same as CEE 251, ME 207, MS&E 285.) Negotiation styles and processes to help students conduct and review negotiations. Workshop format integrating intellectual and experiential learning. Exercises, presentations, live and field examples, and individual and small group reviews. 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, Aut (Clough, R)

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, Aut (Clough, R)

CEE 160. Mechanics of Fluids Laboratory
Lab experiments/demonstrations illustrate conservation principles and flows of real fluids. Corequisite: 101B. (Monismith)

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)

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 165D. Water and Sanitation in Developing Countries
(Same as CEE 265D.) 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.

3 units, Spr (Davis, J)

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. (Freyberg) 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), Sum (Kopperud, R)

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, alternate years, not given this year

CEE 172M. Quantitative Methods for Forecasting Energy Futures
(Same as CEE 272M.) Quantitative methods for assessing the economics of greenhouse gas emissions reductions. Historical success of previous energy and carbon emissions forecasting efforts, top-down and bottom-up modeling methods, and the implications of market imperfections and regulatory distortions. Analytic techniques to explore the future in the face of rapid technological changes.

3 units, Aut (Koomey, J), given once only

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 (Staff)

CEE 173A. Energy Resources
(Same as CEE 207A, EARTHSYS 103.) Fossil and renewable energy resources: oil, natural gas, coal, nuclear, hydropower, solar, geothermal, biomass, wind, ocean energy, and energy efficiency. Topics for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. 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)

CEE 175A. Law and Science of California Coastal Policy
(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.

3-4 units, Win (Boehm, A; Sivas, D; Caldwell, M)

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
(Same as CEE 276F.) Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2008. 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
Undergraduate-level introduction to the 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)

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 application and interview. See http://esw.stanford.edu for application.

1-5 units, Aut (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 (Canales, 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 179B. Process Design for Environmental Biotechnology
(Same as CEE 275B.) Alternates with 169. Preference to juniors and seniors in Civil or Environmental Engineering. The design of a water or wastewater treatment system using biological processes to remove contaminants. Student teams characterize contaminants in water or wastewater, design and operate bench- and pilot-scale units, and develop a full-scale design. Limited enrollment. Prerequisites: 177, 179A. GER:DB-EngrAppSci

5 units, Spr (Criddle, C)

CEE 179C. Environmental Engineering Design
Application of engineering fundamentals including environmental engineering, hydrology, and engineering economy to a design problem. 2005-06 project was green water for a green dorm. Enrollment limited; preference to seniors in Civil and Environmental Engineering.

5 units, not given this year

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, Spr (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 (Staff)

CEE 183. Integrated Building Design
Studio format. Design concepts for building systems from schematic design through construction, taking into account sustainable engineering issues. Design exercises culminating in the design of a building project, emphasizing structural systems and materials and integration with architecture, construction, and building mechanical systems. Prerequisites: CEE 180, 181, 182; civil engineering major; architectural design majors require consent of instructor.

4 units, Spr (Miranda, E)

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 geologic fundamentals to the planning and design of civil engineering projects. Field exercises and case studies emphasize the impact of site geology on the planning, design, and construction of civil works such as buildings, foundations, transportation facilities, excavations, tunnels and underground storage space, and water supply facilities. Topics: Quaternary history and tectonics, formation and physical properties of surficial deposits, site investigation techniques, geologic hazards, 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.

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 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 (Chui, T)

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; Liu, X)

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.

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 206. Decision and Stochastic Processes Models in Civil Engineering
Current challenges in selecting an appropriate site, alternate design, or retrofit strategy based on environmental, economic, and social factors through applications of decision science. Basics of decision theory with examples from civil engineering problems. Theory and methods for modeling of loads, structural parameters, environmental effects, rainfall, and other processes in civil engineering. Stochastic models include Poisson, compound Poisson, filtered Poisson, non-homogenous Poisson, and Markov processes. Prerequisite: CEE 203 or equivalent.

3-4 units, Aut (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, Aut (Kiremidjian, A)

CEE 207A. Energy Resources
(Same as CEE 173A, EARTHSYS 103.) Fossil and renewable energy resources: oil, natural gas, coal, nuclear, hydropower, solar, geothermal, biomass, wind, ocean energy, and energy efficiency. Topics for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. 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)

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 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, Aut (Haymaker, J)

CEE 222A. Computer Integrated Architecture/Engineering/Construction (AEC) Global Teamwork
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 223A. Design and Construction of Steel Structures
Using a 15-story steel building project, students analyze the implications of design decisions on the fabrication and erection of steel structures. Emphasis is on integration of design and construction of different types of steel structures. The implications on structural performance, cost and construction schedule, and evaluation of design alternatives. Economic considerations. Other topics include planning for lead times, floor systems and lateral load

resisting systems, composite floor systems, innovative lateral load resisting systems, economics of steel structures, design and construction of steel connections, implication of design decisions related to welding and bolting. Prerequisite: 181 or equivalent.

3-4 units, Aut (Miranda, E)

CEE 223B. Design and Construction of Concrete Structures
Implications of design decisions in the structural performance, cost, and construction schedule of concrete structures. Emphasis is on integration of design and construction of concrete structures and on economic considerations. Reinforced concrete and pre-stressed concrete structures. Evaluation of design alternatives. Economic considerations in the selection of floor systems and lateral resisting systems for buildings. Design and construction of beams, one way slabs, post-tensioned slabs, beam-column joints and structural walls. Design and construction of precast and post-tensioned elements, and of connections in precast elements. Prerequisite: 182 or equivalent.

3-4 units, not given this year

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 (Lin, M), Win (Staff), Spr (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, Spr (Redd, T)

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 (Staff)

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 (Staff)

CEE 227. Global Project Finance
(Same as GSBGEN 394.) 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.

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 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. 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, Aut (Flager, F)

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 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 240. Design and Management of Construction Operations
Designing on-site construction processes including: goals, roles, responsibilities, performance metrics; inputs/outputs; labor and capital intensive construction methods, task assignments and crew instructions, safety management and site supervision, and productivity measurement; value stream modeling, materials management, daily and weekly progress, and financial reports; site operations and management; observation methods for field operations; construction process modeling and simulation methods; and digital models for planning and executing site operations. Field and computer lab work. Prerequisite: 100 or equivalent or consent of instructor. Recommended corequisite: 241.

3 units, Win (Fischer, M)

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.

3 units, Aut (Fischer, M)

CEE 242. Organization Design for Projects and Companies
Introduction to organizational behavior. Information-processing theory and computer analysis tools to design organizations for projects and companies; practice facilitating 12-person case study discussion groups. Cases focus primarily on engineering and construction organizations, but applicable to project-based organizations in all industries.

3-4 units, Aut (Levitt, R)

CEE 242A. Creating Sustainable Development
(Same as CEE 142A.) How the built environment influences the way people interact with each other in communities. Case studies. How tradeoffs among economic, ecological, and social benefits can be managed. Frameworks for managing stakeholder processes including negotiating multiparty processes. Group project. Enrollment limited to 50.

3 units, Win (Christensen, S)

CEE 243. Integrated Concurrent Engineering
(Same as CEE 143.) Computer-based models in building design and construction. Virtual design and construction (VDC): the use of multidisciplinary performance models of design-construction projects, including the product (facilities), work processes, organization of the design-construction-operation team, and economic impact (model of both cost and value of capital investments) to support business objectives. Opportunity for 4-day mini-internship at an A/E/C company over Spring break. Prerequisite for undergraduates: 100 or consent of instructor. Recommended for graduate students: 241, 242.

3-4 units, not given this year

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.
4 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 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 (Clough, R)

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 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, ME 207, MS&E 285.) Negotiation styles and processes to help students conduct and review negotiations. Workshop format integrating intellectual and experiential learning. Exercises, presentations, live and field examples, and individual and small group reviews. Application required before first day of class; see Coursework.
3 units, Aut (Christensen, S), Spr (Christensen, S)

CEE 252. Technical Fundamentals of Sustainable Construction
Balancing sustainability and traditional project objectives in providing technical support for concrete and steel construction operations. Concrete materials, properties of fresh concrete. Resources and methods for batching, transporting, placing, finishing, and curing concrete. Design, fabrication, and use of formwork. Detailing, fabricating, erecting, and connecting structural steel. Lifting equipment and lift planning. Welding processes, operations, and quality control. Group field trip reports, course projects. Corequisite: 258.
3 units, Win (Tatum, C)

CEE 253A. Sustainable Earthwork Construction
Balancing sustainability and traditional project objectives in planning and providing technical support for earthwork construction operations. Construction properties of soil. Technical fundamentals and description of earthwork equipment and operations. Planning, selecting equipment, estimating production rates.
1 unit, Spr (Tatum, C)

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, Aut (Clough, R)

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. Sustainability, integration and coordination, commissioning.
1 unit, Spr (Tatum, C)

CEE 258. Donald R. Watson Seminar in Construction Engineering and Management
Seminar; field trips. Focus is on technical aspects of concrete construction, steel construction, and earthwork. May be repeated for credit.
1 unit, Win (Tatum, C)

CEE 259. Career Skills Seminar
(Same as CEE 159. 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, Aut (Clough, R)

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. 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, Spr (Staff)

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; Walker, K)

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 (Monismith, S)

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 (Monismith, S)

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, flow reactors, and traffic flow. Prerequisites: CME 102 and 104, or equivalents.

3 units, Spr (Fringer, O), Sum (Staff)

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, Spr (Fong, D)

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, Win (Monismith, S)

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), alternate years, not given next year

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)

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, Spr (Findikakis, A)

CEE 265D. Water and Sanitation in Developing Countries
(Same as CEE 165D.) 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.

3 units, Spr (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), alternate years, not given next year

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 (Kitanidis, P)

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 (Monismith, S)

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 271Y. Environmental Policy Design and Implementation in the U.S and Asia
In Singapore, September 11 to 16, 2008. Preference to M.S. students in Environmental and Water Studies. How the design and implementation of policy instruments to control air and water pollution are influenced by administrative and legal structures and by interplay among participants such as regulators, polluters, and nongovernmental organizations. Prerequisite: consent of instructor.

2 units, Aut (Ortolano, L), given once only

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 272M. Quantitative Methods for Forecasting Energy Futures
(Same as CEE 172M.) Quantitative methods for assessing the economics of greenhouse gas emissions reductions. Historical success of previous energy and carbon emissions forecasting efforts, top-down and bottom-up modeling methods, and the implications of market imperfections and regulatory distortions. Analytic techniques to explore the future in the face of rapid technological changes.

3 units, Aut (Koomey, J), given once only

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 (Staff)

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, Spr (Leckie, J)

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 BIO 41, CHEMENG 181 (formerly 188), or equivalents.
3 units, Aut (Krieger, C), Sum (Staff)

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), alternate years, not given next year

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, Spr (Criddle, C), alternate years, not given next 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
Microbiology skills including culture-, microscope-, and molecular-based detection techniques. Focus is on standard and EPA-approved methods to enumerate and isolate organisms used to assess risk of enteric illnesses, such as coliforms, enterococci, and coliphage, in drinking and recreational waters including lakes, streams, and coastal waters. Student project to assess the microbial water quality of a natural water. Limited enrollment; priority to CEE graduate students.
3-4 units, Spr (Boehm, A)

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 275A. Law and Science of California Coastal Policy
(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.
3-4 units, Win (Boehm, A; Sivas, D; Caldwell, M)

CEE 275B. Process Design for Environmental Biotechnology
(Same as CEE 179B.) Alternates with 169. Preference to juniors and seniors in Civil or Environmental Engineering. The design of a water or wastewater treatment system using biological processes to remove contaminants. Student teams characterize contaminants in water or wastewater, design and operate bench- and pilot-scale units, and develop a full-scale design. Limited enrollment. Prerequisites: 177, 179A.
5 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 (Canales, 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 units, Spr (Ong, C)

CEE 276F. Energy Systems Field Trips
(Same as CEE 176F.) Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2008. 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 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, Win (Staff)

CEE 277B. Knowledge Systems in Engineering and Management for Sustainable Development
Knowledge frameworks and systems dealing with large amounts of complex information from crossdisciplinary collaborative activities in sustainable development. Topics include: domain information and knowledge representation and processing; knowledge management and integration in engineering and management domains; access to information for problem solving, planning, and decision making; knowledge management for environmentally friendly manufacturing and business activities; systematic assessment in management and engineering; and the use of IT and the Internet for collaboration and learning.
3 units, Spr (Staff), Sum (Staff)

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.
1-5 units, Aut (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, Spr (Hildemann, L)

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, alternate years, not given this year

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, 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. Finite Element Methods in Structural Engineering
Finite element formulation and implementation of frame, solid, plate, and shell elements for numerical methods. Modeling of structural systems, statics and dynamics, structural analysis. Prerequisites: 280, 283.

4 units, Spr (Law, K)

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 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, Aut (Law, K)

CEE 284. Computational Methods in Structural Dynamics
Methods of structural dynamics for discretized and continuous systems in free and forced vibration, modal analysis; numerical methods; introduction to nonlinear dynamics; advanced topics. Prerequisites: 280, 283. (Law)

3 units, not given this year

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, Win (Krawinkler, H)

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, design of structures to minimize damage, force-based and displacement-based design methods, capacity design, detailing and construction of steel and reinforced concrete structures, performance-based design, seismic isolation, and energy dissipation. Prerequisites: 283, 285. Recommended: 282, 288.

3-4 units, Win (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 (Borja, R)

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: ME 335A or equivalent.

3 units, not given this year

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, Spr (Meehan, R)

CEE 297G. Structural Geology and Rock Mechanics
(Same as 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)

CEE 297H. Structural Geology and Rock Mechanics
(Same as 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 (Pollard, D)

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 (Law, K)

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 (Horne, R), Win (Horne, R), Spr (Horne, R)

CEE 310. Post-Master's Seminar
For post-master's students to serve as orientation to the selection of a research topic.
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

CEE 316. Research Methods in Facility Engineering
For CEE Ph.D. students. Facility planning, design, management, and operation. Research philosophy and methods. Experimental design: ethnography, case study, survey, classical experiment (natural, synthetic, or computational). Data analysis: ANOVA, regression, correlation. Introduction to modeling social systems. Publication strategies. Final project to develop and refine research proposal and publication plan.
3-4 units, given next 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 (Kunz, J), 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, Spr (Staff)

CEE 333. Water Policy Colloquium
(Same as GES 333, IPER 333.) Student-organized interdisciplinary colloquium. Creation, implementation, and analysis of policy affecting the use and management of water resources. Weekly speakers from academia and local, state, national, and international agencies and organizations.
1 unit, Spr (Freyberg, D)

CEE 341P. Politics and Infrastructure Investment
Political and social challenges awaiting global infrastructure investors. Sources include literature in economic history, international business, development, political economy, sociology. and communications. Foundations of conflict between external stakeholders and investors/operators, and best practice tools and frameworks for mitigating conflict. Students draft a research proposal or a project-specific political and social risk mitigation proposal.
2-4 units, Aut (Staff)

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 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, Spr (Kitanidis, P), alternate years, not given next 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 363B. Geophysical Fluid Dynamics
(Formerly 364B.) Focus is on fluid dynamics of the ocean at scales where the influence of the earth's rotation is important. Topics include geostrophic and quasi-geostrophic flows, planetary waves, potential vorticity, the Rossby adjustment problem, effects of stratification, and flows on the sea plane. Hydrodynamic stability of rotating and stratified flows. Prerequisite: 363A.
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 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 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 376. Organic Analyses in Environmental Sciences

Theory and practice of instrumental methods used in environmental engineering and sciences, emphasizing determination of organic substances by gas chromatography, mass spectrometry, and high pressure liquid chromatography. Interpretation of mass spectra adaptation of techniques to specific environmental matrices. Case studies. Prerequisite: consent of instructor.

2-3 units, not given this year

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 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)

OVERSEAS STUDIES COURSES IN CIVIL AND ENVIRONMENTAL ENGINEERING

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUSTRALIA CIVIL AND ENVIRONMENTAL ENGINEERING COURSES

OSPAUSTL 10. Coral Reef Ecosystems
3 units, Aut (Hoegh-Guldberg, O; Ward, S; Arrigo, K)

OSPAUSTL 20. Coastal Resource Management
3 units, Aut (Johnstone, R)

OSPAUSTL 30. Coastal Forest Ecosystems
3 units, Aut (Hall, J)

CLASSICS ART/ARCHAEOLOGY (CLASSART) COURSES

For information on undergraduate and graduate programs in the Department of Classics, see the "Classics" section of this bulletin.

UNDERGRADUATE COURSES IN CLASSICS ART/ARCHAEOLOGY

CLASSART 20. Introduction to Classical Archaeology
The materials and practices of classical Archaeology, from the Bronze Age Aegean through classical Greece and the Roman Empire. Huts and palaces, tombs and temples, and the structuring roles of the environment, demography, religion, and power. Sites include: Troy, Thera, Athens, Rome, Pompeii. Techniques include stratigraphic excavation, art historical analysis, carbon dating, and osteoarchaeology.
3-5 units, Win (Trimble, J)

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, Win (Shanks, M)

CLASSART 61. Introduction to Greek Archaeology
The material remains of Greek civilization, including architecture, art, and written sources, and how to interpret them; what they reveal about the world of the Greeks and about current western civilization. How has reception of the classical past influenced modern political and social development? Topics include: the palace societies of the Bronze Age, the archaic age of colonization and the rise of the polis; the beginnings of classical Athenian democracy; and the conquests of Alexander the Great.
3-5 units, not given this year

CLASSART 81. Introduction to Roman Archaeology
Methods and materials, from the 8th century B.C.E. to the 4th century C.E. The physical remains of the Roman world and their relationship to today. What material culture reveals about the Romans; the legacy of the Romans in the modern world. Sculpture, wall painting, mosaics, tombs, and architecture; and practical, field-oriented approaches. Settlement patterns; development of artistic and architectural expertise; monumentalization in the late republic and early empire; and shifts and tensions in social norms.
4-5 units, not given this year

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. Classical and 4th-Century Greek Art
(Same as ARTHIST 102, ARTHIST 302.) The formation of the classical ideal in 5th-century Athenian art, and its transformation and diffusion in the 5th and 4th centuries against changing Greek history, politics, and religion. 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.
5 units, Aut (Maxmin, J)

CLASSART 110. Appropriations of Greek Art
(Same as ARTHIST 204A.) The history of the appropriation of Greek art by Rome, the Renaissance, Lord Elgin, and Manet.
5 units, not given this year

CLASSART 113. Ten Things: Science, Technology, and 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
4-5 units, Win (Shanks, M)

CLASSART 114. Ceramics: Art and Science
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 149. Roman Portraits and Persons
(Same as CLASSART 249.) From Republican verism to imperial types to changes in the tetrarchy and late antiquity. Interactions of portrait heads with stock bodies, the physical setting, and visual culture more broadly. The role of ancient ideas about representation, including physiognomy, biography, social position, ethnic identity and memory. How to assign dates; techniques; how to interpret contexts and meanings. GER:DB-Hum
4-5 units, Spr (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: Science, Technology, and 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.

4-5 units, Win (Shanks, M)

CLASSART 249. Roman Portraits and Persons
(Same as CLASSART 149.) From Republican verism to imperial types to changes in the tetrarchy and late antiquity. Interactions of portrait heads with stock bodies, the physical setting, and visual culture more broadly. The role of ancient ideas about representation, including physiognomy, biography, social position, ethnic identity and memory. How to assign dates; techniques; how to interpret contexts and meanings.

4-5 units, Spr (Trimble, J)

CLASSART 250. Cultural Heritage and Classical Antiquities
Comparative analysis of American and Italian cultural heritage practices concerning Greek and Roman antiquities. Themes include ethical, cultural, and legal situations of classical artifacts in American museums; constructions of the classical past in national contexts and the role of antiquities museums; and changing concepts of material relationships with the past. One-week field trip to Rome to compare installation and presentation practices in major museums.

5 units, not given this year

CLASSART 300. Early Greece: Social Archaeology, 1100-700 B.C.E.
Archaeological and textual evidence for the transformation of Greek society. Economic, social, political, and cultural changes from the world of Mycenaean palaces to the small city states of the archaic period.

4-5 units, Win (Morris, I)

CLASSART 301. Domesticating the Periphery: Neolithic Societies of the Aegean
Developments in Greece from the 7th-4th millennia B.C.E. Focus is on the processes that led from early Holocene gatherers to Neolithic farmers, and material culture in that region of S.E. Europe. Archaeological sites, cultural groups, and geographical areas. A synthesis of the archaeological evidence from the Aegean in connection with the eastern Mediterranean and the Balkans, and theoretical and methodological problems involved in reconstructing these communities within a research tradition dominated by classical Greece.

3-5 units, given once only

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)

CLASSART 323. Archaeology of the Roman Economy
Recent developments. Focus is on changing frameworks, including Mediterraneanization and concepts of growth; differences between historians' and archaeologists' interests and methods; problems of scale and integration; relationships of models, fieldwork design, and archaeological data. Case studies may include the olive oil industry; the marble trade and connections of art and economics; and the Roman army and its economic workings and impact.

5 units, not given this year

CLASSICS GENERAL (CLASSGEN) COURSES

For information on undergraduate and graduate programs in the Department of Classics, see the "Classics" section of this bulletin. Students interested in literature and literary studies should also consult course listings in Chinese, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. For courses in modern Greek language with the subject code SPECLANG, see the "Language Center" section of this bulletin.

UNDERGRADUATE COURSES IN CLASSICS GENERAL

CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent
(F,Sem Same as DRAMA 12N.) Stanford Introductory Seminar. 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

4 units, Win (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 (Myers, M)

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 (Clayton, B)

CLASSGEN 22. Technologies of Civilization: Writing, Number, and Money
The technological keys to the growth of civilization that enabled the creation of complex societies and enhanced human cognition. The role of cognition in shaping history and the role of history in shaping cognition. Global perspective, emphasizing the Western tradition and its ancient Greek roots. GER:DB-Hum

4-5 units, Aut (Netz, R)

CLASSGEN 45N. Conversations: Catullus, Virgil, and their Influence on the Prose and Poetry of Robert Frost
Stanford Introductory Seminar. Preference to freshmen. Poems by Catullus and Virgil (in Latin or in translation) and by Robert Frost. Why Frost kept the poetry of Catullus close at hand throughout his life; the relationship between a writer's reading and writing; and how emotional experience can be transmuted into verbal at. Sound, rhythm, meter, the order of words, artful construction of short poems, and the dramatic function of conversation. Poetry recitation and creative writing.

3-5 units, Spr (Lain, N)

CLASSGEN 48N. Ethical Wisdom in Greek Tragedy and Philosophy
Stanford Introductory Seminar. Preference to freshmen. What sorts of ethical values are found in Greek tragedies? Modes of ethical wisdom promoted and enacted in Greek tragedy and philosophy in the classical period emphasizing modes of wisdom that reflected traditional Greek religion and traditional social and political values in democratic Athens. GER:DB-Hum

3-5 units, Spr (Nightingale, A)

CLASSGEN 60. The Life and Death of a Roman City: Pompeii
The development of Pompeii from its early settlements to its luxurious urban center. Focus is on aspects of daily life such as family, slavery, economy, women, politics and religion. The décor of private houses and civic buildings, including the imperial display of power. The impact of Pompeii on the modern world, including art, architecture, and urban design. GER:DB-Hum

4-5 units, offered occasionally

CLASSGEN 66. Herodotus
For Ancient History field of study majors; others by consent of instructor. Close reading technique. Historical background to the Greco-Persian Wars; ancient views of empire, culture, and geography; the wars and their aftermath; ancient ethnography and historiography, including the first narrative of ancient Egypt. GER:DB-Hum

4-5 units, offered occasionally

CLASSGEN 81. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

CLASSGEN 94. Ethics of Pleasure
The concept of pleasure in Greek culture, thought, poetry, and philosophy. How physical, sensual, and intellectual types of pleasure are described and defined in Greek texts and visual arts. The relationship between individual and public/political experiences of pleasure; the intersection between aesthetics and ethics. GER:DB-Hum, GER: EC-EthicReas
3-5 units, not given this year

CLASSGEN 101. Stoics and Epicureans: Explorations in Embodied Philosophical Practice
Two of the main philosophical schools of Hellenistic and Roman times, Epicureanism and Stoicism, focusing on these philosophies as practices, especially bodily practices. Their shared emphasis on the body and the physical self as an inevitable concern in the quest for freedom from disturbance. The body and its needs as the central vehicle for demonstrating the success of each philosophy's account of the natural world. Ancient bodily practices and modern receptions of these practices. GER:DB-Hum
3-5 units, Aut (Staff)

CLASSGEN 111. Croesus and Solon: Polemical Interpretation of Olbos
Croesus, ruler of Lydia in the 6th century B.C.E. until the kingdom was absorbed into the Persian Empire; how he became a part of Greek culture. Historical, artistic, and poetic sources relating to his personality and reign. The concept of olbos or prosperity. Readings include the Athenian legislator and poet Solon, Herodotus, and the praise poet Bacchylides. GER:DB-Hum
4-5 units, Spr (Gonzalez, A), given once only

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, Win (Trimble, J)

CLASSGEN 123. Urban Sustainabilty: 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 130. Singers of Tales: Ancient and Contemporary Epic in Action
How epic reflects and molds the thinking of its audiences and practitioners in many parts of the world today. The content and methods of epic performance in Egypt, Central Asia, north and central India, and among the Nyanga of Africa. Emphasis is on the aesthetic and ethnographic: that is, on the epic as crafted, meaning-rich performances, and on its role in the everyday life of common people in contemporary non-Western cultural areas. GER:DB-Hum, EC-GlobalCom
3-4 units, Spr (Staff)

CLASSGEN 154. Social Power: The Law and the State, a Comparative Study of Ancient Legal Systems
(Same as CLASSGEN 354.) Ancient Mediterranean legal systems, from ancient Egypt and the Near East to Greece and Rome. Focus is on ancient documents including the *Code of Hammurabi*, Egyptian sale contracts, as well as analysis of ancient law such as Maine's Ancient Law, and Weber. The development of the law; solutions in ancient societies to the common problems of crime, contract, inheritance, marriage, and the family; and the enforcement of property rights. GER:DB-SocSci
3-5 units, offered occasionally

CLASSGEN 160. Directed Readings (Undergraduate)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 174. Martyrdom in the Ancient World
(Same as RELIGST 174.) Jewish, Christian, and pagan narratives of persecution and resistance. Emphasis is on ancient documents in translation. 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, Aut (Gleason, M)

CLASSGEN 176. Majors Seminar: Gods and Physicians, Saints and Dreams,Health and Healing in the Ancient World
Required of Classics majors and minors in junior or senior year; students contemplating honors should take this course in junior year. In the ancient world, what we now call science and religion intersected in practices of health and healing. Beliefs and practices that converged on the body through case studies. Close reading and decoding of cultural clues from a of religious and medical traditions. WIM
4-5 units, Win (Gleason, M; Haas, C)

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, not given this year

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, not given this year

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 (Kaesser, C)

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 (Barchiesi, A)

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 208A. Survey of Greek and Latin Literature: Archaic Greek
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, alternate years, not given this year

CLASSGEN 208B. Survey of Greek and Latin Literature: Classical Greek
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, alternate years, not given this year

CLASSGEN 208C. Survey of Greek and Latin Literature: Hellenistic and Late Greek
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, alternate years, not given this year

CLASSGEN 220. Family, Gender, and Production in Ancient Rome
(Same as HISTORY 311A.) Seminar. The household as the basic unit of production in Rome in the context of family relations and ideologies of gender. Methodological challenges of doing social and economic history from literary, epigraphic, and literary texts. Demography of family and kinship in ancient Rome. Ideologies of gender and family roles and their influence on economic production. Economic theories of the family and human capital.
4-5 units, not given this year

CLASSGEN 223. Urban Sustainabilty: 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 225. Metamorphoses of Dido
Focus is on Dido in Virgil; the complexities of her characterization and its bearing on an overall view of the poem, her scant previous appearances, and intertextual models. The continuing fascination with Dido by later authors from Ovid to the 2oth century. Possible topics include Latin and Christian authors, medieval rewritings, Chaucer, Marlowe, and Dido in music and painting.
3-5 units, Spr (Schiesaro, A), given once only

CLASSGEN 235. Petronius and Apuleius
Petronius' Satyricon and Apuleius' Metamorphoses represent the surviving Latin novel. Differences between them. Readings include Petronius' dinner at Trimalchio's and Apuleius' love story of Cupid and Psyche. Philological analysis, history of the novel, and social history of the Roman empire. The afterlife of these texts. Recent scholarship.
4-5 units, offered occasionally

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 245. Roman Receptions of Hellenistic Poetry
The beginnings of Latin literature in Greek literature, primarily in texts transmitted through imperial courts of the Greek east such as Alexandria and Pergamum. Aesthetic, formal, and theoretical aspects of transmission; cultural contexts of reception, including Ennius and Lucilius, Catullus and Cicero, Horace and Vergil, and Propertius and Ovid.
4-5 units, not given this year

CLASSGEN 260. Directed Reading in Classics (Graduate Students)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSGEN 283. Catullus: Textual Criticism and Related Points of Interest
Housman's definition of textual criticism as the science of discovering error in texts and the art of removing it. How scholars have attempted to emend problematic passages in Catullus.
4-5 units, Aut (Lain, N)

CLASSGEN 305. Pleasure in Greek Thought
The conceptualization of pleasure in Greek culture; the relationship between individual and public/political experiences and representations of pleasure; intersections among aesthetics, politics, and sexuality in Greek thought.
3-5 units, Win (Peponi, A)

CLASSGEN 310A. Inscribed Lives: Roman Epigraphy in Context
How to read Roman (mostly Latin) inscriptions. The use of inscriptions in studying Roman history. Sources include texts such as the Res Gestae Divi Augusti and the Tabula Siarensis. Archaeological contexts; electronic and other resources. Research projects on a theme for which inscriptions provide main evidence. Guest speakers include John Bodel, Brown University.
3-5 units, Win (Parker, G; Scheidel, W)

CLASSGEN 310B. Inscribed Lives: Roman Epigraphy in Context
Continuation of 310A. Prerequisite: CLASSGEN 310A.
3-5 units, Spr (Scheidel, W; Parker, G)

CLASSGEN 314. Fragments
The reconstruction and interpretation of fragmentary texts; how to deal with Latin poetry in fragments, emphasizing the Republican and Augustan ages. Sources include anthologies by E. Courtney and Adrian Hollis. Techniques of analysis including philology, textual criticism, and questions about Greek models. The importance of fragments for literary and cultural history.
4-5 units, offered occasionally

CLASSGEN 324. Choral Poetry and Performance
Representative readings of choral lyric poetry. Interpretation of the most complex choral discourse developed in archaic and classical Greece. The cultural context in which choral performances took place in the Greek polis.
4-5 units, not given this year

CLASSGEN 332. Pragmatogony: Archaeological Perspectives on the Origins of Things
Relationships with artifacts and the material world; design and making, innovation and cultural change. Design, manufacture, distribution, and consumption of goods. Sources include philosophy, design studies, sociology and history of technology, science studies, art history, and anthropological archaeology. Case studies from early agricultural societies and Graeco-Roman antiquity.
5 units, Spr (Shanks, M)

CLASSGEN 352. Ovid's Metamorphoses
Competing 20th-century approaches. Emphasis is on new research and how to compose research papers. Topics include: narratology, reception, gender, poetics, time and space, mythology, material culture, hellenization, romanization, orientalism, allusion and intertextuality, and emotions.
4-5 units, not given this year

CLASSGEN 354. Social Power: The Law and the State, a Comparative Study of Ancient Legal Systems
(Same as CLASSGEN 154.) For ancient history majors and those interested in the history of law. Ancient Mediterranean legal systems, from ancient Egypt and the Near East to Greece and Rome. Focus is on ancient documents including the *Code of Hammurabi*, Egyptian sale contracts, as well as analysis of ancient law such as Maine's Ancient Law, and Weber. The development of the law; solutions in ancient societies to the common problems of crime, contract, inheritance, marriage, and the family; and the enforcement of property rights.
3-5 units, offered occasionally

CLASSGEN 360. Dissertation Research in Classics
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

CLASSICS GREEK (CLASSGRK) COURSES

For information on undergraduate and graduate programs in the Department of Classics, see the "Classics" section of this bulletin. Students interested in literature and literary studies should also consult course listings in Chinese, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. For courses in modern Greek language with the subject code SPECLANG, see the "Language Center" section of this bulletin.

UNDERGRADUATE COURSES IN CLASSICS GREEK

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. Separate section for Biblical Greek.
3-5 units, Aut (Porta, F)

CLASSGRK 2. Beginning Greek
Continuation of CLASSGRK 1. Classics majors and minors must take course for letter grade. Vocabulary and syntax of the classical language. Separate section for Biblical Greek.
3-5 units, Win (Porta, F)

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 (Porta, F)

CLASSGRK 5. Introduction to New Testament Greek
Vocabulary, grammar, morphology, and syntax of koinê Greek, the original language of the writings gathered in the New Testament. Students read selections from Luke, John, the Pauline epistles, and Acts. No previous knowledge of Greek required.
3-5 units, Sum (Staff)

CLASSGRK 101. Intermediate Greek: Plato's Apology of Socrates
Focus is on grammar, syntax, style, and comprehension of a literary text. Literary and cultural contexts. Classics majors and minors must take course for letter grade. May be repeated for credit.
3-5 units, Aut (Simonton, M)

CLASSGRK 102. Intermediate Greek: Greek Tragedy
The tragedy of Euripides. Emphasis is on literary and historical analysis. Classics majors and minors must take course for letter grade. May be repeated for credit.
4-5 units, Win (Duncan, A)

CLASSGRK 103. Intermediate Greek: 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 (Boterf, N)

CLASSGRK 111. Advanced Greek: Scientific Writings
Reading texts from Greek mathematics, physics, and biology. The relationship between form and meaning in the presentation of scientific information. Classics majors and minors must take course for letter grade. May be repeated for credit.
3-5 units, Aut (Staff)

CLASSGRK 112. Advanced Greek: Lyric Poetry
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, Win (Peponi, A)

CLASSGRK 113. Advanced Greek: Thucydides
Classics majors and minors must take course for letter grade. Topics include the style and language in which themes of community crisis and empire were first turned into history by this master of Athenian prose. May be repeated for credit.
3-5 units, Spr (Ceserani, G)

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.
2 units, Win (Clayton, B)

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.
4 units, Spr (Clayton, B)

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.
2 units, Win (Clayton, B)

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.
4 units, Spr (Clayton, B)

CLASSGRK 301. Greek Dialects and the History of Ancient Greek
Greek epigraphy and the linguistic history of the Greek language including Greek dialects.
1-5 units, Aut (Porta, F)

CLASSGRK 327. Aeschylus
Literary and philological study of the Oresteia and Prometheus Bound. Issues of attribution and style, dramaturgy, and ideology. Attention to textual transmission, emendation, and reception.
4-5 units, Aut (Staff)

CLASSICS HISTORY (CLASSHIS) COURSES

For information on undergraduate and graduate programs in the Department of Classics, see the "Classics" section of this bulletin. For courses in modern Greek language with the subject code SPECLANG, see the "Language Center" section of this bulletin.

UNDERGRADUATE COURSES IN CLASSICS HISTORY

CLASSHIS 37N. The Early Roman Emperors: HIstory, Biography, and Fiction
(F,Sem Same as HISTORY 12N.) Stanford Introductory Seminar. Preference to freshmen. The politics, drama, and characters of the period after the fall of the Roman Republic in 49 B.C.E. Issues of liberty and autocracy explored by Roman writers through history and biography. The nature of history writing, how expectations about literary genres shape the materials, the line between biography and fiction,and senatorial ideology of liberty. Readings include: Tacitus' Annals, Suetonius' Lives of the Caesers, and Robert Graves' I Claudius and episodes from the BBC series of the same title. GER:DB-Hum
3 units, Aut (Saller, R)

CLASSHIS 60. The Romans
How did a tiny village create a huge empire and shape the world, and why did it fail? Roman history, imperialism, politics, social life, economic growth, and religious change. GER:DB-Hum

3-5 units, Spr (Scheidel, W)

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 106. Life and Death in China's Late Antiquity
(Same as CLASSHIS 206.) Multidisciplinary, heuristic approach. How to piece together the worldview of life and death during the Eastern Han dynasty and subsequent Three Kingdoms period; the emergence of a new elite that would dominate the sociopolitical landscapes of medieval China and the birth of the Silk Road, the world's first international highway of commerce, culture, and religion. Sources include: materials and methods of archaeology, history, textual studies, and art history to interpret excavated evidence; and visual and interactive resources. GER:DB-Hum

4-5 units, Win (Staff), given once only

CLASSHIS 133. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 333, HUMNTIES 321, 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

5 units, Win (Ober, J)

CLASSHIS 137. Models of Democracy
(Same as CLASSHIS 237, COMM 212, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

CLASSHIS 171. Alexander the Great and the Hellenistic World
When Alexander the Great swept through and conquered the Persian empire at the end of the 4th century B.C., it touched off massive changes in the political and socioeconomic structure of the Mediterranean world. Focus is on the major developments in the history, culture, and economy of the Mediterranean world from these conquests of Alexander to the annexation of Egypt by Augustus in 30 B.C.E. GER:DB-Hum

3-5 units, offered occasionally

GRADUATE COURSES IN CLASSICS HISTORY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

CLASSHIS 206. Life and Death in China's Late Antiquity
(Same as CLASSHIS 106.) Multidisciplinary, heuristic approach. How to piece together the worldview of life and death during the Eastern Han dynasty and subsequent Three Kingdoms period; the emergence of a new elite that would dominate the sociopolitical landscapes of medieval China and the birth of the Silk Road, the world's first international highway of commerce, culture, and religion. Sources include: materials and methods of archaeology, history, textual studies, and art history to interpret excavated evidence; and visual and interactive resources.

4-5 units, Win (Staff), given once only

CLASSHIS 237. Models of Democracy
(Same as CLASSHIS 137, COMM 212, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

CLASSHIS 307. Introduction to Papyrology
Research methods, history of interpretation, paleography of Greek papyri, and interconnections between Greek and demotic material.

3-5 units, offered occasionally

CLASSHIS 312. Big Ancient History
(Same as HISTORY 311G.) How the shift away from thinking about European history in terms of a western civilization model toward embedding it in stories of how global history affects research and teaching on ancient Greece and Rome. Conventional, evolutionary, and global history narratives of the past 5,000 to 15,000 years and some new ideas about how Greco-Roman history might fit into different storylines.

4-5 units, Spr (Morris, I)

CLASSHIS 332. High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests
(Same as POLISCI 331.) Normative political theory combined with positive political theory to better explain how major texts may have responded to and influenced changes in formal and informal institutions. Emphasis is on historical periods in which catastrophic institutional failure was a recent memory or a realistic possibility. Case studies include Greek city-states in the classical periodand the northern Atlantic community of the 17th and 18th centuries including upheavals in England and the American Revolutionary era.

4-5 units, Win (Ober, J; Weingast, B)

CLASSHIS 333. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, HUMNTIES 321, 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.

5 units, Win (Ober, J)

CLASSICS LATIN (CLASSLAT) COURSES

For information on undergraduate and graduate programs in the Department of Classics, see the "Classics" section of this bulletin. Students interested in literature and literary studies should also consult course listings in Chinese, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. For courses in modern Greek language with the subject code SPECLANG, see the "Language Center" section of this bulletin.

UNDERGRADUATE COURSES IN CLASSICS LATIN

CLASSLAT 1. Beginning Latin: Vocabulary and Syntax
Vocabulary and syntax of the classical language, preparing students for readings including Cicero, Caesar, and Catullus. No previous knowledge of Latin is assumed. Classics majors and minors must take course for letter grade.

3-5 units, Aut (Lain, N)

CLASSLAT 2. Beginning Latin: Vocabulary and Syntax
Continuation of CLASSLAT 1. Classics majors and minors must take course for letter grade.

3-5 units, Win (Lain, N)

CLASSLAT 3. Beginning Latin: Vocabulary and Syntax
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 (Lain, N)

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.
7-9 units, Sum (Staff)

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 (Lain, N)

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: Horace
His epodes, satires, epistles, and odes; literary and historical analysis. Classics majors and minors must take course for a letter grade. May be repeated for credit.
3-5 units, Spr (Jones, E)

CLASSLAT 107. Medieval Latin: Chronicles of the Wicked Emperor
Post-classical Latin through the 13th-century chronicle of Salimbene di Guido di Adam. His colorful portraits of the evil friar Elias and the wicked Emperor Frederick II, the stupor mundi. Focus is on reading the Latin text; attention to grammatical reviews. Classics majors and minors must take course for letter grade. Prerequisite: one year of college Latin or equivalent.
3-5 units, Win (Janda, S)

CLASSLAT 111. Advanced Latin: Seneca's Letters
Literary, stylistic, and philosophical aspects of Seneca's epistolary writings. Readings in Latin and English. Classic majors and minors must take course for a letter grade. May be repeated for credit.
3-5 units, Aut (Totten, D)

CLASSLAT 112. Advanced Latin: Virgils's Aeneid
Classics majors and minors must take course for letter grade. May be repeated for credit.
3-5 units, Win (Barchiesi, A)

CLASSLAT 113. Advanced Latin: Latin Love Elegy
The erotic elegies of Propertius, Tibullus, and Ovid. Thematic focus on the representation of the city of Rome, and the role of the metropolis in the poems' erotic discourse. May be repeated for credit.
3-5 units, Spr (Kaesser, C)

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.
4 units, not given this year

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, not given this year

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.
4 units, not given this year

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, not given this year

COMMUNICATION (COMM) COURSES

For information on undergraduate and graduate programs in the Department of Communication, see the "Communication" section of this bulletin.

UNDERGRADUATE COURSES IN COMMUNICATION

COMM 1A. Media Technologies, People, and Society
(Same as COMM 211. Graduate students register for 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
5 units, not given this year

COMM 1B. Media, Culture, and Society
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. GER:DB-SocSci
5 units, Aut (Gangadharan, S), Win (Frankel, G), Spr (Gangadharan, S)

COMM 106. Communication Research Methods
(Same as COMM 206. Graduate students register for 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
5 units, Win (Staff)

COMM 107. The First Amendment in the Digital Age
(Same as COMM 207. Graduate students register for 207.) Interdisciplinary. Legal, institutional, sociological, and technological framework for free expression in democracy. History, values, and principles of the First Amendment. The challenge of new technology to old doctrine. Impact of the Internet on issues of free speech, such as political criticism, fair use, defamation, low value speech, professional privilege, and public forum in an era of private networks. How do new social networking technologies produce the expertise and accountability promoted by the First Amendment?
5 units, not given this year

COMM 108. Media Processes and Effects
(Same as COMM 208. Graduate students register for 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
5 units, Aut (Bailenson, J)

COMM 116. Journalism Law
(Same as COMM 216. Undergraduates register for 116.) 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.
5 units, Aut (Wheaton, J)

COMM 117. Digital Journalism
(Same as 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.
5 units, Win (Rheingold, H)

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 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. GER:DB-SocSci, WIM
5 units, Spr (Turner, F)

COMM 124. Political Communication and Political Behavior
(Same as COMM 224.) Research seminar. The political behavior of ordinary citizens and its roots in political communication, including public opinion, political participation, voting behavior, and political psychology. Deliberation and its effects.
5 units, Aut (Luskin, R)

COMM 125. Perspectives on American Journalism
(Same as COMM 225. Graduate students register for 225.) Issues, ideas, and concepts in the development of American journalism, emphasizing the role of the press in society, the meaning and nature of news, and professional norms that influence conduct in and outside the newsroom. Prerequisite: 1 or junior standing. GER:DB-SocSci
5 units, Aut (Glasser, T)

COMM 126. Advanced Topics in Human Virtual Representation
(Same as COMM 226, COMM 326. Undergraduates register for 126; master's students for 226; doctoral students for 326.) 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, Win (Bailenson, J)

COMM 131. Media Ethics and Responsibility
(Same as 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
5 units, Win (Glasser, T)

COMM 136. Democracy and the Communication of Consent
(Same as COMM 236, POLISCI 134.) 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
5 units, not given this year

COMM 140. Digital Media Entrepreneurship
(Same as 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.
5 units, Spr (Grimes, A)

COMM 147. Modern History and Future of Journalism
(Same as 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?
5 units, Spr (Brinkley, J)

COMM 150. Political Information
(Same as COMM 250.) Political information held by ordinary citizens: how it can best be measured, how it is acquired, who has how much of it, and how and to what extent it flavors the public's attitudes and behaviors. Policy and electoral preferences, attitude extremity,persuadability.
5 units, Win (Luskin, R)

COMM 158. Free Expression and Intellectual Property in the Digital Age
(Same as COMM 258.) How intellectual property law fosters and hinders free speech. When does an author or inventor have a right to re-use someone else's creative expression? Are appropriation of other people's art, music sampling, and reverse engineering a theft of property or the basis of innovation? How technologies such as as wikis, virtual worlds, youtube, and search engines challenge the balance between constitutional protection of intellectual property and the First Amendment. Fundamentals of trade secret, patent, copyright, and trademark law and policy. No prior legal knowledge required.
5 units, not given this year

COMM 160. The Press and the Political Process
(Same as COMM 260, POLISCI 323R.) The role of mass media and other channels of communication in political and electoral processes. GER:DB-SocSci
5 units, Win (Iyengar, S)

COMM 162. Analysis of Political Campaigns
(Same as COMM 262, POLISCI 323S.) Seminar. The evolution of American political campaigns, and the replacement of the political party by the mass media as intermediary between candidates and voters. Academic literature on media strategies, the relationship between candidates and the press, the effects of campaigns on voter behavior, and inconsistencies between media campaigns and democratic norms. Do media-based campaigns enable voters to live up to their civic responsibility? Has the need for well-financed campaigns increased the influence of elites over nominations? Have citizens become disengaged? GER:DB-SocSci
5 units, Aut (Iyengar, S)

COMM 166. Virtual People
(Same as 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.
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, Aut (Bailenson, J)

COMM 168. Experimental Research in Advanced User Interfaces
(Same as COMM 268, COMM 368, ME 468. Undergraduates register for 168; master's students for 268; doctoral students for 368.) Project-based course involves small groups designing and implementing an experiment concerning voice and agent user interfaces. Each group is involved in a different, publishable research project. May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Win (Nass, C), Spr (Nass, C)

COMM 169. Computers and Interfaces
(Same as COMM 269. Graduate students register for 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
5 units, Win (Nass, C)

COMM 170. Communication and Children I
(Same as COMM 270. Graduate students register for 270.) Developmental approach to how children come to use and process mass media, what information they obtain, and how their behavior is influenced by the media. Prerequisite: 1, PSYCH 1, or SOC 1. GER:DB-SocSci

5 units, Win (Roberts, D)

COMM 172. Media Psychology
(Same as COMM 272. Graduate students register for 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

5 units, Aut (Reeves, B)

COMM 177D. Specialized Writing and Reporting: Magazine Journalism
(Same as COMM 277D. Graduate students register for 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.

5 units, Aut (Frankel, G)

COMM 177F. Specialized Writing and Reporting: Literary Journalism
(Same as COMM 277F. Undergraduates register for 177F.) Using the tools of literature to tell the true stories of journalism. Characterization, narrative plotting, scene-setting, point of view, tone and style, and the techniques of reporting for literary journalism, interviewing, and story structure. Prerequisite: 104 or consent of instructor.

5 units, not given this year

COMM 177G. Specialized Writing and Reporting: Follow the Money, Reporting on Business and Finance
(Same as COMM 277G.) How to write news and feature stories about companies and personalities in the business world. Prerequisite: 104 or consent of instructor.

5 units, Win (Grimes, A)

COMM 177K. Specialized Writing and Reporting: Human Rights Journalism
(Same as 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.

5 units, Spr (Staff)

COMM 177R. Specialized Writing and Reporting: Covering Silicon Valley
(Same as COMM 277R. Undergraduates register for 177R.) Techniques to write and report about Silicon Valley technologies. Visits from professional writers. Prerequisite: 104 or consent of instructor.

5 units, Win (Markoff, J; Zachary, G)

COMM 177S. Specialized Writing and Reporting: Sports Journalism
(Same as 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.

5 units, Win (Pomerantz, G)

COMM 177Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East
(Same as COMM 277Y.) What's involved in working as a journalist in one of the most important and dangerous parts of the world.

5 units, Aut (Brinkley, J)

COMM 182. Virtual Communities and Social Media
(Same as COMM 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.

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 CLASSHIS 137, CLASSHIS 237, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

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 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

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 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 units, Win (Staff)

COMM 207. The First Amendment in the Digital Age
(Same as COMM 107. Graduate students register for 207.) Interdisciplinary. Legal, institutional, sociological, and technological framework for free expression in democracy. History, values, and principles of the First Amendment. The challenge of new technology to old doctrine. Impact of the Internet on issues of free speech, such as political criticism, fair use, defamation, low value speech, professional privilege, and public forum in an era of private networks. How do new social networking technologies produce the expertise and accountability promoted by the First Amendment?

4 units, not given this year

COMM 208. Media Processes and Effects
(Same as COMM 108. Graduate students register for 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 units, Aut (Bailenson, J)

COMM 211. Media Technologies, People, and Society
(Same as COMM 1A. Graduate students register for 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 units, not given this year

COMM 216. Journalism Law
(Same as COMM 116. Undergraduates register for 116.) 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 units, Aut (Wheaton, J)

COMM 217. Digital Journalism
(Same as COMM 117.) 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 units, Win (Rheingold, H)

COMM 220. Digital Media in Society
(Same as 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.
4 units, Spr (Turner, F)

COMM 224. Political Communication and Political Behavior
(Same as COMM 124.) Research seminar. The political behavior of ordinary citizens and its roots in political communication, including public opinion, political participation, voting behavior, and political psychology. Deliberation and its effects.
4 units, Aut (Luskin, R)

COMM 225. Perspectives on American Journalism
(Same as COMM 125. Graduate students register for 225.) Issues, ideas, and concepts in the development of American journalism, emphasizing the role of the press in society, the meaning and nature of news, and professional norms that influence conduct in and outside the newsroom. Prerequisite: 1 or junior standing.
4 units, Aut (Glasser, T)

COMM 226. Advanced Topics in Human Virtual Representation
(Same as COMM 126, COMM 326. Undergraduates register for 126; master's students for 226; doctoral students for 326.) 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, Win (Bailenson, J)

COMM 231. Media Ethics and Responsibility
(Same as COMM 131.) 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 units, Win (Glasser, T)

COMM 236. Democracy and the Communication of Consent
(Same as COMM 136, POLISCI 134.) 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 units, not given this year

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.) 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.
4 units, Spr (Grimes, A)

COMM 247. Modern History and Future of Journalism
(Same as COMM 147.) 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 units, Spr (Brinkley, J)

COMM 250. Political Information
(Same as COMM 150.) Political information held by ordinary citizens: how it can best be measured, how it is acquired, who has how much of it, and how and to what extent it flavors the public's attitudes and behaviors. Policy and electoral preferences, attitude extremity,persuadability.
4 units, Win (Luskin, R)

COMM 257. Networked Governance: Democracy and New Technology
(Same as COMM 357.) Interdisciplinary seminar. The impact of technology on government institutions. How to use communications, law, and technology to engage experts and the broader public in decision making. Student teams develop implementation ready pilot projects for the next presidential administration.
1-5 units, Aut (Noveck, B)

COMM 258. Free Expression and Intellectual Property in the Digital Age
(Same as COMM 158.) How intellectual property law fosters and hinders free speech. When does an author or inventor have a right to re-use someone else's creative expression? Are appropriation of other people's art, music sampling, and reverse engineering a theft of property or the basis of innovation? How technologies such as as wikis, virtual worlds, youtube, and search engines challenge the balance between constitutional protection of intellectual property and the First Amendment. Fundamentals of trade secret, patent, copyright, and trademark law and policy. No prior legal knowledge required.
4 units, not given this year

COMM 260. The Press and the Political Process
(Same as COMM 160, POLISCI 323R.) The role of mass media and other channels of communication in political and electoral processes.
4 units, Win (Iyengar, S)

COMM 262. Analysis of Political Campaigns
(Same as COMM 162, POLISCI 323S.) Seminar. The evolution of American political campaigns, and the replacement of the political party by the mass media as intermediary between candidates and voters. Academic literature on media strategies, the relationship between candidates and the press, the effects of campaigns on voter behavior, and inconsistencies between media campaigns and democratic norms. Do media-based campaigns enable voters to live

up to their civic responsibility? Has the need for well-financed campaigns increased the influence of elites over nominations? Have citizens become disengaged?

4 units, Aut (Iyengar, S)

COMM 266. Virtual People
(Same as COMM 166.) 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 units, Spr (Bailenson, J)

COMM 268. Experimental Research in Advanced User Interfaces
(Same as COMM 168, COMM 368, ME 468. Undergraduates register for 168; master's students for 268; doctoral students for 368.) Project-based course involves small groups designing and implementing an experiment concerning voice and agent user interfaces. Each group is involved in a different, publishable research project. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Win (Nass, C), Spr (Nass, C)

COMM 269. Computers and Interfaces
(Same as COMM 169. Graduate students register for 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 units, Win (Nass, C)

COMM 270. Communication and Children I
(Same as COMM 170. Graduate students register for 270.) Developmental approach to how children come to use and process mass media, what information they obtain, and how their behavior is influenced by the media. Prerequisite: 1, PSYCH 1, or SOC 1.

4 units, Win (Roberts, D)

COMM 272. Media Psychology
(Same as COMM 172. Graduate students register for 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 units, Aut (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.

4 units, Aut (Grimes, A)

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.

4 units, Win (Brinkley, J)

COMM 277D. Specialized Writing and Reporting: Magazine Journalism
(Same as COMM 177D. Graduate students register for 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 units, Aut (Frankel, G)

COMM 277F. Specialized Writing and Reporting: Literary Journalism
(Same as COMM 177F. Undergraduates register for 177F.) Using the tools of literature to tell the true stories of journalism. Characterization, narrative plotting, scene-setting, point of view, tone and style, and the techniques of reporting for literary journalism, interviewing, and story structure. Prerequisite: 104 or consent of instructor.

4 units, not given this year

COMM 277G. Specialized Writing and Reporting: Follow the Money, Reporting on Business and Finance
(Same as COMM 177G.) How to write news and feature stories about companies and personalities in the business world. Prerequisite: 104 or consent of instructor.

4 units, Win (Grimes, A)

COMM 277K. Specialized Writing and Reporting: Human Rights Journalism
(Same as COMM 177K.) 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 units, Spr (Staff)

COMM 277R. Specialized Writing and Reporting: Covering Silicon Valley
(Same as COMM 177R. Undergraduates register for 177R.) Techniques to write and report about Silicon Valley technologies. Visits from professional writers. Prerequisite: 104 or consent of instructor.

4 units, Win (Markoff, J; Zachary, G)

COMM 277S. Specialized Writing and Reporting: Sports Journalism
(Same as COMM 177S.) 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 units, Win (Pomerantz, G)

COMM 277Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East
(Same as COMM 177Y.) What's involved in working as a journalist in one of the most important and dangerous parts of the world.

4 units, Aut (Brinkley, J)

COMM 282. Virtual Communities and Social Media
(Same as COMM 182.) 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 units, Aut (Rheingold, H)

COMM 289. Journalism Master's Project

4 units, Win (Staff), 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. Journalists in or visiting the Bay Area are often guest speakers. May be repeated for credit.

1 unit, Aut (Grimes, A), Win (Frankel, G), Spr (Brinkley, J)

COMM 299. Individual Work

1-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMM 301. Communication Curriculum Development and Pedagogy
Required of all second-year Ph.D. students.

1 unit, Aut (Gauthier, L)

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. Methods of Analysis Program in the Social Sciences (MAPSS) Workshop
(Same as POLISCI 402.) 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. May be repeated for credit.
1 unit, Aut (Jackman, S), Win (Jackman, S), Spr (Jackman, S)

COMM 311. Theory of Communication
Required of Communication doctoral students.
1-5 units, Win (Reeves, B)

COMM 312. Models of Democracy
(Same as CLASSHIS 137, CLASSHIS 237, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

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.
1-3 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 319. Doctoral Research Methods III
Prerequisite: consent of instructor.
1-5 units, not given this year

COMM 320G. Advanced Topics in New Media and American Culture
Primarily for Ph.D. students. Prerequisite: 220 (formerly 219) or consent of instructor.
1-5 units, not given this year

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, not given this year

COMM 326. Advanced Topics in Human Virtual Representation
(Same as COMM 126, COMM 226. Undergraduates register for 126; master's students for 226; doctoral students for 326.) 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, Win (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.) Conflicting visions of what a democracy is or might be; 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 357. Networked Governance: Democracy and New Technology
(Same as COMM 257.) Interdisciplinary seminar. The impact of technology on government institutions. How to use communications, law, and technology to engage experts and the broader public in decision making. Student teams develop implementation ready pilot projects for the next presidential administration.
1-5 units, Aut (Noveck, B)

COMM 360G. Political Communication
Limited to Ph.D. students. Advanced topics. Prerequisite: 260 or consent of instructor.
1-5 units, Spr (Iyengar, S)

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. Undergraduates register for 168; master's students for 268; doctoral students for 368.) Project-based course involves small groups designing and implementing an experiment concerning voice and agent user interfaces. Each group is involved in a different, publishable research project. May be repeated for credit. Prerequisite: consent of instructor.
1-5 units, Win (Nass, C), Spr (Nass, C)

COMM 370G. Communication and Children
Limited to Ph.D. students. Prerequisite: 270 or consent of instructor.
1-5 units, Win (Roberts, D)

COMM 372G. Seminar in Psychological Processing
Limited to Ph.D. students. Advanced topics. Prerequisite: 272 or consent of instructor.
1-5 units, not given this year

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.
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 andmodern 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, Spr (Turner, F; Lee, P)

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)

OVERSEAS STUDIES COURSES IN COMMUNICATION

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE COMMUNICATION COURSES

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
5 units, Win (Campani, E)

COMPARATIVE LITERATURE (COMPLIT) COURSES

For information on undergraduate and graduate programs in the Department of Comparative Literature, see the "Comparative Literature" section of this bulletin. Students interested in literature and literary studies should also consult course listings in the Chinese, Classics, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature, and in the Division of Literatures, Cultures, and Languages. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages.

COMPARATIVE LITERATURE COURSE CATALOG 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

UNDERGRADUATE COURSES IN COMPARATIVE LITERATURE

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 (Parker, P)

COMPLIT 21N. First Person Singular
Stanford Introductory Seminar. Preference to freshmen. How first person narrative has been used across Western literature from antiquity to the present, in works including nonfictional autobiography, records of travel and testimonial, novels, and lyric poetry. Nonfictional readings may include Augustine, Rousseau, Cook, Equiano, and Freud; novels by Montesquieu, Mary Shelley, Conrad, and Levi; and poems by Rimbaud and Rilke. The use of the first-person in online media. GER:DB-Hum
5 units, Spr (Cohen, M)

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
3-5 units, Aut (Palumbo-Liu, D)

COMPLIT 54N. Reading in Common
Stanford Introductory Seminar. Preference to freshmen. The personal and social functions of literary narrative. How do works of literature serve as ways for people to communicate with each other? Are fiction readers part of a broad, transhistorical community of readers? How does that membership shape the way authors write their own life stories? Writers include: Ruth Ozeki, Ondaatje, Calvino, and Gordimer.
5 units, Spr (Palumbo-Liu, D)

COMPLIT 61Q. Culture and Conflict in Contemporary Europe
(S,Sem Same as GERGEN 61Q.) Stanford Introductory Seminar. Preference to sophomores. Transformation of European culture and identity in the wake of the Cold War, European unification, and the post 9/11 environment. Pressures on transatlantic relationships; anti-Americanism; tensions around national cultural identity due to regional integration and globalization; immigration and the European experience of multiculturalism; and flashpoints of conflict concerning religion, secularization, and antisemitism.
3-5 units, Spr (Berman, R)

COMPLIT 101. What is Literature?
How do scholars distinguish literary texts from other written genres such as history, philosophy, journalism, memoirs, biographies, lyrics, graffiti, or billboards? Who decides what is literature? What are the boundaries between literary and nonliterary texts. To what extent do literary texts offer a moral or political message? What are the aesthetic effects of literary as opposed to nonliterary texts? Sources include various genres, texts, and interpretive theories and methodologies. GER:DB-Hum
5 units, Aut (Palumbo-Liu, D)

COMPLIT 115. Nabokov in the Transnational Context
(Same as COMPLIT 215, SLAVGEN 156, SLAVGEN 256.) Nabakov's techniques of migration and camouflage as he inhabits the literary and historical contexts of St. Petersburg, Berlin, Paris, America, and Switzerland. His early and late stories, last Russian novel *The Gift, Lolita* (the novel and screenplay), and *Pale Fire*. Readings in English.GER:DB-Hum
3-4 units, Spr (Greenleaf, M)

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, Win (Frank, J)

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 (Greene, R)

COMPLIT 122. Literature as Performance

(Same as FRENGEN 122.) 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

3-5 units, Win (Gumbrecht, H)

COMPLIT 123. The Novel, The World

(Same as ENGLISH 184.) 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.

5 units, Spr (Moretti, F)

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, Win (Bender, J)

COMPLIT 127A. Short Stories from the Arab World

Comparative analysis of short stories from the Arab world, especially N. Africa. The depiction of the fantastic, political satire, language hybridism, and genre fusion; Arab prose between European translation and anticolonial nationalism. Critical accounts of the Arab *nahda* (renaissance) and its importance for literary renovation, the impact of pan-Arab sentiment on literary production, and the status of the French language in N. Africa. Readings in French and Arabic original or in English translation.

4-5 units, Aut (Ellis, M)

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, Spr (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, Win (Greene, R)

COMPLIT 146. The Literature of Worldliness

Literary texts concerned with the mastery of social forms and codes of conduct. The cultural institution of *le monde* as it develops in modern France and England. Focus is on novels whose predominant subject matter is the initiation of individuals into the techniques and practices necessary to enhance their social position. The literature of worldliness is the literature of being together, a tradition which explores the constitutive role of others in the formation of the self. Authors include Saint-Simon, Jane Austen, Frances Burney, Stendhal, and Proust.

5 units, Aut (Moore, C)

COMPLIT 148. Introduction to Asian American Cultures

Preference to Asian American Studies and CSRE majors. Asian American cultural production (film, drama, poetry, fiction, music) in sociohistorical context. Topics include ethnicity, race, class, and gender, and the political economy of ethnic culture in the U.S. GER:DB-Hum, EC-AmerCul

3-5 units, Win (Staff)

COMPLIT 149. 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 151. Theories of Poetic Life

The Western tradition of the poetic life and the notion that it is a realm of its own beyond the oppositions of the individual and the political, the exemplar and the species, the sensual and the spiritual. Intermittently described as vitality, eros, inspiration, or power, it cannot be reduced to any of those, but is articulated at their intersections. Authors such as Plato, Ovid, Petrarch, Kleist, Nietzsche, and Benjamin.

4 units, Win (Klinger, F)

COMPLIT 181. Philosophy and Literature

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 units, Win (Anderson, L; Vermeule, B)

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

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

COMPLIT 198. Digital Humanities Workshop

(Same as HUMNTIES 198W.) Post-print models of research and scholarship in humanities fields. Toolkits being employed in such work from wikis to interactive media to virtual worlds; and theories and practices in the digital humanities field. Student projects.

4 units, Spr (Schnapp, J)

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 211. Albert Camus and Jean-Paul Sartre: French Existentialism in the Post-World War II Period
(Same as FRENGEN 211.) Philosophical and literary works of two of the most widely read and canonized authors of the mid-20th century. The texts and times of French existentialism, and changing relationships to this tradition. Prerequisite: reading knowledge of French. GER:DB-Hum
3-5 units, Win (Gumbrecht, H)

COMPLIT 223. Courtly Love in Classical Persian Poetry
Classical Persian poems addressing secular and religious journeys in search of truth, happiness, and the heroic life. Texts include Ferdowsi's *Shahnameh*, Rumi's *Masnavi*, Attar's *Conference of the Birds*, and Gorgani's *Vis and Ramin*. All texts in English translation.
5 units, Aut (Davis, R)

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, Win (Greene, R)

COMPLIT 246A. Literature and Film of Modern Iran
Iran's social structures, political system, cultural tendencies, and modern artistic culture.
3-5 units, Spr (Shamel, M)

COMPLIT 247A. Borderland Identities and Cultural Hybridity between Europe and America
A comparison of texts by Afro-German, Turkish-German, and Austrian women of color with texts by U.S. Latina and African American writers in light of critical paradigms from Chicana theory. Themes include home, identity, community, and nation. The international dialogue of women of color and the cultural specificities of Europeans of color.
5 units, Win (Fellner, A)

COMPLIT 248. Afghanistan: Literature and History
Sources include poetry, short stories, novels, film, and secondary sources.
3-5 units, Aut (Shamel, M)

COMPLIT 248A. CSI Vienna: American Culture in Austria since 1980
The cultural transfer of American popular culture including recent work on globalization, cultural history, cultural studies, visual culture theory, and the performative turn in cultural theory. Focus is on American cultural impact on Austria, including the transfer of musical idioms such as the blues and Bob Dylan, television shows such as CSI, road movies, and consumer goods as symbols of American everyday life.
5 units, Spr (Fellner, A)

GRADUATE COURSES IN COMPARATIVE LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

COMPLIT 215. Nabokov in the Transnational Context
(Same as COMPLIT 115, SLAVGEN 156, SLAVGEN 256.) Nabakov's techniques of migration and camouflage as he inhabits the literary and historical contexts of St. Petersburg, Berlin, Paris, America, and Switzerland. His early and late stories, last Russian novel *The Gift, Lolita* (the novel and screenplay), and *Pale Fire*. Readings in English.
3-4 units, Spr (Greenleaf, M)

COMPLIT 215A. Gottfried Benn and Francis Ponge: Mid-20th-Century European Poetry and the Problem of the Referent
(Same as FRENGEN 215, GERLIT 215.) Comparative readings of the two poets in their respective national contexts, with attention to biographical and poetological frameworks. Canonic status and scholarly reception histories. Renewed interest in their work with regard to their distinctive practices of connecting prosodic form and extra textual referents. Prerequisite: reading knowledge of German or French.
3-5 units, Aut (Gumbrecht, H)

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, Aut (Schnapp, J)

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, Win (Frank, J)

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, Spr (Eshel, A; White, H)

COMPLIT 232A. Time of Latency: Western Cultures in the Decade After 1945
(Same as FRENGEN 232, ITALGEN 232.) Retrospective accounts and contemporary experience converge in the description of the decade following 1945 as a period of quietude that seemed to repress an unknown trauma. Goal is to reconstruct the mood of this historical moment and its relationship to the early 21st century. Sources include canonical texts and everyday documents from different national and cultural contexts. Advanced undergrads require consent of instructor.
3-5 units, Aut (Gumbrecht, H)

COMPLIT 235. Staging Knowledge
Exhibition practices and curatorship in the interdisciplinary humanities through the design of an experimental exhibition space concerning the actuality of late 18th-century individualism. 18th-century politics, music, fine arts, philosophy, technology, medicine, and diplomacy in relation to methodological inquiry into display and multiple media. Attention to opera as particular stagings of knowledge: Mozart, da Ponte, Slileri, Casti, Gluck, and Haydn. Theoretical sources include Adorno, Bachelard, Batailles, Freud, Musil, and Warburg.
5 units, Spr (Lachmayer, H)

COMPLIT 238. Futurisms
(Same as ARTHIST 248, ITALGEN 238.) From its foundation in 1909 through WW II, futurism developed into the first truly international cultural-political avant garde. Its aim was the revolutionary transformation of all spheres of life. The movement's manifestations in Italy, Russia, France, Spain, Latin America, and Eastern Europe. Topics: machines and culture; visual poetics and war; futurism's complex ties to bolshevism and fascism. Media:

poetry, performance, music, painting, photography, radio, and film. Writers include: Marinetti, Mayakovsky. Visual artists include: Boccioni, Bragaglia, Russolo, Malevich, Lissitzky.

5 units, Win (Schnapp, J; Gough, M)

COMPLIT 242A. China and the World: Aesthetics, Ethics, and Literature

(Same as CHINLIT 251.) How 20th-century Chinese thinkers and writers envisioned themselves as citizens of the world and critiqued traditional culture. How intellectuals infused new life into traditional thought and sensibility and made contributions to global culture. The matrix of aesthetics, ethics, and literature. Texts from the Western aesthetic and cosmopolitan tradition.

4-5 units, Aut (Wang, B)

COMPLIT 245A. Fin de Siècle Vienna

Implosive avant gardism in Vienna around 1900: artistic and intellectual anti-traditionalism in the face of forceful resistance by conservative culture. Viennese modernism in architecture and design, theory, literature, and cultural critique. The emergence of Viennese internationalism. Texts by Freud, Kraus, Wagner, Loos and Hoffmann, Mach and the Wiener Kreis, early Wittgenstein, Schiele, Kokoschka, Zemlinsky, early Schönberg, Weber, and Berg. Viennese modernism as a hypercritic self-construction of individualism as an inspiring decadence.

5 units, Spr (Lachmayer, H)

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, Win (Boyi, E)

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, Aut (Bender, J)

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, Spr (Parker, P)

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, Win (Parker, P)

COMPLIT 324. Landscapes of the Sublime

The modern notion of the sublime in philosophy, literature, and art, emphasizing its connection to space and landscape. Topics include: how global exploration contributed to the sublime in the late 17th and 18th centuries; the romantic interiorization of the sublime; and the sublime's connection to mimesis, power, work, and technology. Writers may include Milton, Burke, Kant, Deleuze and Guattari, Freud, the Shelleys, Coleridge, Hugo, Baudelaire, and Rimbaud; artists may include Gericault, Turner, Delacroix, and Friedrich.

5 units, Win (Cohen, M)

COMPLIT 327. Genres of the Novel

Literary genres in 18th-19th century novels include picaresque and adventure fiction, domestic fiction, realist fiction, historical fiction, Gothic fiction, sentimental fiction, science fiction, and the novel of ideas. Works may include *Lazarillo de Tormes, Robinson Crusoe, The Castle of Otranto, The Mysteries of Udolpho, The Sorrows of Werher, Claire d'Albe, Ivanhoe, Indiana, Madame Bovary, Voyage to the Center of the Earth*. Theoretical models for genre.

5 units, Spr (Cohen, M)

COMPLIT 358. Psychoanalytic Hermeneutics: Soma, Psyche, and Self in Modernist Discourse

Pseudoscience psychoanalysis considered as a symptom of the cultural disaggregation of the western European humanist idea of selfhood. Freud's formulation of the psychoanalytical project in Interpretation of Dreams and his revisions of the project in works such as *Totem and Taboo, Beyond the Pleasure Principle, Ego and Id, Instincts, Moses*. Post-Freudian revisions as represented by figures such as Klein, Abraham, Lacan, and LaPlanche. Postmodernist adaptations of the project by Lear, Ronnen, Bloom, and Derrida. Recommended: ability to read German and French.

5 units, Spr (White, H)

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), Spr (Gumbrecht, H)

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 395. Research

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 (except for Comparative Literature students teaching in a foreign language). Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers.

2 units, Aut (Vermeule, B)

COMPLIT 399. Dissertation

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

COMPARATIVE MEDICINE (COMPMED) COURSES

For information on graduate programs in the Department of Comparative Medicine, see the "Comparative Medicine" section of this bulletin. Course and laboratory instruction in the Department of Comparative Medicine conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN COMPARATIVE MEDICINE

COMPMED 81N. Comparative Anatomy and Physiology of Mammals

Stanford Introductory Seminar. Preference to sophomores. Comparative approach to common mammals, laboratory, and domestic species. The unique adaptations of each species in terms of its morphological, anatomical, and behavioral characteristics. How these species interact with human beings and other animals. GER:DB-NatSci

3 units, Win (Bouley, D)

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 diagnostic, treatment, and control principles associated with these pathogens.

3 units, Spr (Felt, S)

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 (Bouley, D), Win (Bouley, D), Spr (Bouley, D)

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.
1-18 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

For information on undergraduate programs in Comparative Studies in Race and Ethnicity, see the "Comparative Studies in Race and Ethnicity" section of this bulletin.

UNDERGRADUATE COURSES IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

CSRE 12. Presidential Politics: Race, Class, Faith, and Gender in the 2008 Election
(Same as AFRICAAM 12.) From the 2008 nomination process to the election between Senators John McCain and Barack Obama.The complexities of identity and its role in uniting and dividing the electorate. Panels covering the media, political participation, and group affiliation.
1-3 units, Aut (Elam, M; Snipp, C)

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 109B. Indian Country Economic Development
(Same as NATIVEAM 109B.) The history of competing tribal and Western economic models, and the legal, political, social, and cultural implications for tribal economic development. Case studies include mineral resource extraction, gaming, and cultural tourism. 21st-century strategies for sustainable economic development and protection of political and cultural sovereignty.
5 units, not given this year

CSRE 117S. History of California Indians
(Same as 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)

CSRE 121C. Chicana/o Film Practices
(Same as CHICANST 121C.) The ideological parameters of Chicanismo, including migration, labor, organized state violence, collectivism, familialism, spirtual practices, gender, and sexual politics. The cultural, aesthetic, and political dimensions of film form, including formal and textual analysis.
5 units, not given this year

CSRE 121R. Redefining the Nation: Chicana/o Literature and Art From the 1960s to the Present
(Same as CHICANST 121R.) Topics include categories of national identity construction and identity performance such as the body, family, and community. Borderlands as a transnational concept emphasizing links between the U.S. and other regions of the continent.
5 units, Win (Staff)

CSRE 122. Introduction to Latina Literature
(Same as CHICANST 122.) Interdisciplinary. Intracultural differences amongst Latinas such as around immigration. Themes include gender, sexuality, identity, language politics, transnationalism, socioeonomic status, and the notion of homeland and its loss and reclamation.
3-5 units, Spr (Staff)

CSRE 131. Race and Reconciliation in Post-Apartheid Literature
Modes of racial reconciliation and differentiation in post-apartheid literature, motivated by seemingly contradictory impulses: to

surmount racial differences by integrating into a national culture; and for racial identity through the revival of diverse ethnic origins. The relationship between literary aesthetics and racial politics for a society seeking radical but peaceful transition.

5 units, not given this year

CSRE 131A. Race and Reconciliation in Post-Apartheid Literature

How the writers of the new S. Africa have narrated the past as a way of imagining its future. Racial reconciliation in new S. African literature, and the relationship between literary aesthetics and racial politics for a society in transition. Negotiation and invention motivated by a desire to surmount racial differences through integration into a national culture and a yearning for racial identity through the revival of diverse ethnic origins.

5 units, not given this year

CSRE 145A. Poetics and Politics of Caribbean Women's Literature

(Same as ANTHRO 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 165A. Chicana/o History

(Same as CHICANST 165A, HISTORY 264X.) The history of Mexican-origin people in the U.S. from 1848 to the present. Mexican American experiences as integral to American history. Tthemes include the effects of conquest, patterns of migration, labor and the formation of social classes, racialization, gender roles, ideology, and political activism.

5 units, Aut (Staff)

CSRE 173S. Transcultural and Multiethnic Lives: Contexts, Controversies, and Challenges

(Same as 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 (Staff)

CSRE 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America

(Same as DRAMA 179G, DRAMA 279G.) Gateway course for Institute for Diversity in Arts concentration. People of color aesthetics from contemporary art works in conversation with native (American, African, Asian) origins, gender, and sexuality; the formation of cultural identity. Final project.

5 units, Spr (Moraga, C)

CSRE 180C. Asian American Sexualities

(Same as ASNAMST 180C, PSYCH 180C.) Seminar. Mutual constitution of culture and sexuality among Asian Americans; attitudes, behaviors, taboos, and identity. How masculinity and femininity are portrayed in the media; cultural attitudes toward homosexuality; and sexual politics. Social, political, and psychological implications.

5 units, not given this year

CSRE 187C. Latino Children: Cultural and Social Contexts of Development

(Same as CHICANST 187C.) Ecological contexts, including family, school, and society, that shape the psychosocial and educational outcomes of Latino children. Sources include developmental and cultural psychology, anthropology of education, and sociology.

5 units, not given this year

CSRE 189W. Language and Minority Rights

(Same as CHICANST 189W.) 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.

3 units, Win (Staff)

CSRE 190. Disciplinary Boundaries: Research Methods in the Academy

Faculty presentations from Anthropology, English, Psychology, Political Science, History, Sociology, and Drama. Collaborative research, and feminist ethnographic methods.

3 units, not given this year

CSRE 192. Race and Slavery in Brazil and the United States

Did race motivate enslavement or was racial profiling a product of slavery? Brazilian or American slavery and what it means to be a person of color in these countries today. Love, hatred, and endurance in two divided societies. Sources include historical narratives, literature, film, music, and iconography.

5 units, not given this year

CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity

(Same as ENGLISH 172D, HISTORY 65, 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, given next year

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.

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 unit, Win (Quinn, R)

CSRE 200X. CSRE Senior Seminar

5 units, not given this year

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 (Montoya, J; Steyer, J)

GRADUATE COURSES IN COMPARATIVE STUDIES IN RACE AND ETHNICITY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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 200Y. CSRE Senior Honors Research

1-10 units, Win (Staff)

CSRE 200Z. CSRE Senior Honors Research

1-10 units, Spr (Staff)

COMPUTATIONAL AND MATHEMATICAL ENGINEERING (CME) COURSES

For information on graduate programs in the Institute for Computational and Mathematical Engineering, see the " Computational and Mathematical Engineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN COMPUTATIONAL AND MATHEMATICAL ENGINEERING

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 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 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 105. Introduction to Discrete Mathematics and Algorithms
Discrete mathematics and algorithms as used in modeling and problem solving technique emphasizing contemporary problems. Topics: introduction to set theory, logic, combinatorics, and graphs theory; formal proof techniques in induction, recursion, and contradiction; algorithms for sorting, shortest paths, minimum spanning trees, and bipartite matching. Applications to Internet advertising, viral marketing, routing, social networks and games of chance. Recommended: background in linear algebra/matrix theory.
3 units, Sum (Arcaute Aizpuru, E)

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, and physical sciences and engineering: numerical solution of systems of algebraic equations, least squares, quadrature, minimization of a function, banded matrices, nonlinear equations, numerical solution of ordinary and partial differential equations; truncation error, numerical stability for time dependent problems, stiffness, boundary value problems. Prerequisites: CS106A 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, Win (Lambers, J), 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.) Solving matrix-vector systems. Direct and iterative solvers for non-singular linear systems of equations; their accuracy, convergence properties, and computational efficiency. Under- and over-determined systems, and nonlinear systems of equations. Eigenvalues, eigenvectors, and singular values; their application to engineering problems. Concepts such as basis, linear independence, column space, null space, rank, norms and condition numbers, projections, and matrix properties. Recommended: familiarity with computer programming; mathematics background equivalent to MATH 103, 130.
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 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 (Moin, P)

CME 210. Multiscale Methods in Engineering
Multigrid methods to solve partial differential equations including anisotropic and nonlinear equations; multilevel adaptive refinement; fast multipole methods based on Taylor expansions, Chebyshev polynomials, plane wave representation, and singular value decomposition; and wavelets for signal and image compression, Haar wavelets, splines, and multiscale representation of curves and surfaces. Prerequisites: numerical methods (iterative solution of linear equations, interpolation, partial differential equations), scientific programming language.
3 units, given next year

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, Aut (Lambers, J)

CME 212. Introduction to Large-Scale Computing in Engineering

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, Win (Barad, M)

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 291. Master's Research

Students require faculty sponsor.

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 (Lambers, J)

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 (Nolen, J)

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

¬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: Burgers equation, Euler equations for compressible flow, Navier-Stokes equations for incompressible flow. Prerequisites: CME 302, MATH 220A.

3 units, Spr (Fedkiw, R)

CME 308. Stochastic Methods in Engineering

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 (Glynn, P)

CME 324. Advanced Methods in Matrix Computation: Iterative Methods

Eigenvalue problems: perturbation theory, Lanczos method, Jacobi method. Parallel implementation. Singular value problems. Generalized eigenvalue problems. Polynomial equations. Prerequisite: CME 302.

3 units, Spr (Staff)

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 continous 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 330. Applied Mathematics in the Chemical and Biological Sciences

(Same as CHEMENG 300.) Mathematical solution methods via applied problems including chemical reaction sequences, mass and heat transfer in chemical reactors, quantum mechanics, fluid mechanics of reacting systems, and chromatography. Topics include generalized vector space theory, linear operator theory with eigenvalue methods, phase plane methods, perturbation theory (regular and singular), solution of parabolic and elliptic partial differential equations, and transform methods (Laplace and Fourier). Prerequisites: CME 102/ENGR 155A and CME 104/ENGR 155B, or equivalents.

3 units, Aut (Shaqfeh, E)

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 possible. Individual or team projects. May be repeated for credit.

3 units, Aut (Murray, W)

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, Win (Ye, Y), alternate years, not given next 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. Interior methods. The simplex method. Factorization and updates. The reduced-gradient, augmented Lagrangian, and SQP methods. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108 or 302.

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, 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 CS 108; statistics at the level of MATH 103 and STATS 116. Recommended: machine learning at the level of CS 229; knowledge of Java.

1-3 units, Aut (Kamvar, S)

CME 342. Parallel Methods in Numerical Analysis
Emphasis is on techniques for obtaining maximum parallelism in numerical algorithms, especially those occurring when solving matrix problems and partial differential equations, and the subsequent mapping onto the computer. Implementation issues on parallel computers. Topics: parallel architecture, programming models, matrix computations, FFT, fast multiple methods, domain decomposition, and graph partitioning. Prerequisite: CME 302 or 200/ME 300A, or consent of instructor. Recommended: differential equations and advanced programming language such as C or C++.

3 units, Spr (Alonso, J)

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, alternate years, 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, Win (Lew, A)

CME 380. Constructing Scientific Simulation Codes
Practical methods for writing and combining software components to generate simulation applications. Practical methodologies for constructing simulation code applications. How to design, write, and combine software components to generate simulation applications. Steering: using a small driver language like Python to script or steer the progress of a code. Data models and formats: how data is represented and shared inside an application and its external representation on disk. Mixed language programming using C, C++, F77, F90, and Python. Rational software engineering including testing, configuration control, code generation and makefiles. Other technologies needed to create real world applications regardless of scientific discipline.

3 units, Spr (Staff), given once only

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), Sum (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 (Lew, A), Spr (Van Roy, B)

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)

COMPUTER SCIENCE (CS) COURSES

For information on graduate programs in the Department of Computer Science, see the "Computer Science" and "School of Engineering" sections of this bulletin.

COMPUTER SCIENCES COURSE CATALOG NUMBERING SYSTEM

The first digit of a CS course number indicates its general level of sophistication:

1- 99	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

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 106A followed by 106B. Students in 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 106X or may start directly in 106B. CS106A uses Java as its programming language; CS106B and X use C++. No prior knowledge of these languages is assumed, and the prior programming experience required for 103B 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 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; 110 builds on this material, focusing on the development of larger-scale software making use of systems and networking abstractions. in

In summary:

For exposure: 1C
For nontechnical use: 105
For scientific use: 106A
For a technical introduction: 106A
For significant use: 106A,B or 106X, along with 103, 107, and 110

UNDERGRADUATE COURSES IN COMPUTER SCIENCE

Undergraduates are advised to consult the "Guide to Choosing Introductory Courses" in the "Computer Science" section of this bulletin.

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 Coordinator (RCC). Final project. Not a programming course.

1 unit, Aut (Staff)

CS 2C. Intermediate Computing at Stanford
Continuation of 1C. Sound, image and video editing including understanding and publishing multimedia. Applications include GarageBand, Photoshop, Acrobat, iMovie, Final Cut Pro, and iDVD. One-hour lecture/workshop in dormitory clusters prepared and administered weekly by the Resident Computer Coordinator (RCC). Advanced section also available. Final project. Not a programming course.

1 unit, Win (Chan, K)

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, Aut (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.

3 units, Aut (Garcia-Molina, H)

CS 48N. The Science of Art
Stanford Introductory Seminar. Preference to freshmen. The interwoven histories of science and Western art from the Renaissance to the 19th century. Emphasis is on the revolutions in science and mathematics that inspired parallel revolutions in the visual arts such as Brunelleschi's invention of linear perspective, Newton's discoveries in geometric optics, and the theories of color vision proposed by Goethe, Young, and Helmholtz. The scientific principles behind image making including digital image synthesis and computer graphics. No programming experience required. GER:DB-EngrAppSci

3 units, Win (Levoy, M)

CS 51N. Visionaries in Computer Science
Stanford Introductory Seminar. Preference to freshmen. How visionaries anticipated the future; how could they see what their contemporaries did not? How can others strive for comparable achievements? The insights of Alan Turing, Vannevar Bush, Richard Licklider, Ted Nelson, Morton Heilig, Ivan Sutherland, Douglas Engelbart, Alan Kay, Frederick Brooks, and others.

3 units, Spr (Koltun, V)

CS 73N. Business on the Information Highways
Stanford Introductory Seminar. Preference to freshmen. The capabilities of the Internet and its services. Writing for the web. The effect on commerce, education, government, and health care. Technical and business alternatives. Who is hurt and who benefits from the changes? Participants develop web publications.

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. Focus is on technology in elections including topics such as voter registration databases, and electronic and Internet 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 applications. May not be taken by students who have completed 103A,B or 103X. Prerequisite: 106A or equivalent. GER:DB-Math

3-5 units, Win (Plummer, R)

CS 103A. Discrete Mathematics for Computer Science
Final offering of this course. Mathematical foundations required for computer science. Topics: propositional and predicate logic, proof techniques, induction, recursion, combinatorics, and functions. Corequisite: 106A or X. GER:DB-Math

3 units, Aut (Plummer, R)

CS 103B. Discrete Structures
Final offering of this course. Continuation of 103A. Topics: analysis of algorithms, recurrence relations, mathematical formulations of basic data models (sets, relations, linear models, trees and graphs), regular expressions, grammars, and finite automata. Corequisite: 106B or X. GER:DB-Math

3 units, Win (Sahami, M)

CS 103X. Discrete Structures (Accelerated)
Covers the material in 103A and B in a single quarter. The mathematical foundations of computer science.Introduction to set theory and logic, number theory, functions and relations, combinatorics, and graph theory. Prerequisite: background in mathematical formalism and mathematical proof. GER:DB-Math

3-4 units, not given this year

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 (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 programming experience required. GER:DB-EngrAppSci

3-5 units, Aut (Sahami, M), Win (Roberts, E), Spr (Young, P), 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, Win (Cain, G), Spr (Roberts, E), 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 (Staff), Win (Staff), Spr (Staff)

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 (Hurlbutt, T), Spr (Cain, G)

CS 107. Computer Organization and Systems
Autumn topics include: advanced memory management features of C and C++; the difference between imperative and object-oriented paradigms. The functional paradigm (using LISP) and concurrent programming. Other modern languages such as Python, Objective C, and C#. Spring topics include: elements of computer architecture; advanced memory management features of C; elements of code compilation; concurrency and threading. Prerequisite: 106B or X, or consent of instructor. GER:DB-EngrAppSci

3-5 units, Aut (Cain, G), 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 (Jimenez, O), 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: 106B or X, and MATH 51 or equivalent. GER:DB-EngrAppSci

3-5 units, Spr (Sahami, M)

CS 110. Principles of Computer Systems
Building software systems using facilities of operating systems and networking. Topics include: elements of processes and currency mechanics, interprocess communication, storage systems and file management, networking layers and abstractions, sockets, and understanding of distributed systems. Prerequisites: 103 or 103B, and 107. GER:DB-EngrAppSci

3-5 units, Spr (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, Spr (Latombe, J), Sum (Staff)

CS 124. From Languages to Information
(Same as 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.

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: 107. GER:DB-EngrAppSci

3-4 units, Aut (Rosenblum, M), Win (Mazieres, D), Sum (Staff)

CS 142. Web Programming and Security
The web uses complex applications that run on heterogeneous browsers that may be built using programming technologies such as Javascript, AJAX, Google Web Toolkit, Apache Struts, Java Server Faces, and Rails. How core web technologies work; common security vulnerabilities; and how to build secure web applications that avoid them. Prerequisities: 107 and108.

3 units, Win (Boneh, D; Mitchell, 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, routing. Local area networks: ethernet and switches. Wireless networks and network security. Prerequisite: 108 or equivalent.

3-4 units, Aut (Levis, P)

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 and object-relational databases. XML data including the query languages XPath and XQuery. UML database design, and relational design principles based on functional dependencies and normal forms. Indexes, views, transactions, authorization, integrity constraints, and triggers. Advanced topics from data warehousing, data mining, web data management, Datalog, data integration, data streams and continuous queries, and data-intensive web services. Prerequisites: 103 or 103B, and 107. GER:DB-EngrAppSci

3-4 units, Aut (Widom, J)

CS 147. Introduction to Human-Computer Interaction Design
Usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, human cognitive and physical ergonomics, information and interactivity structures, and design tools and environments. Team project in interaction design. Prerequisite: 106B or X or equivalent programming experience.

3-4 units, Aut (Klemmer, S)

CS 148. Introductory Computer Graphics
(Only one of 148 or 248 counts towards any CS degree program.) For undergraduates; M.S. students and those interested in continuing in graphics, register for 248. Two- and three-dimensional computer graphics. Topics: input and display devices, scan conversion of geometric primitives, two- and three-dimensional transformations and clipping, windowing techniques, curves and curved surfaces, three-dimensional viewing and perspective, hidden surface removal,

illumination and color models, OpenGL, and 3-D modeling tools. Emphasis is on practical skills in using graphics libraries and tools. Programming using C/C++ and OpenGL, with demos in SoftImage. Prerequisites: 107, MATH 103. GER:DB-EngrAppSci

3 units, Win (Hanrahan, P), Sum (Staff)

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, Aut (Dill, D), Spr (Motwani, R), 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, Aut (Dill, D), Spr (Motwani, R)

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, Aut (Manna, Z)

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

3-4 units, Aut (Plotkin, S), Win (Roughgarden, T), Sum (Staff)

CS 164. Computing with Physical Objects: Algorithms for Shape and Motion
Algorithms and data structures deadling 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.

3 units, Win (Guibas, L)

CS 178. Digital Photography
Scientific, artistic, and computing aspects of digital photography. Topics: lenses and optics, light and sensors, color theory, optical effects in nature, the laws of perspective and depth of field, sampling and noise, the camera as a computing platform, image processing and editing, and computational photography. Counts as a CS elective in the Graphics track. Prerequisites: basic calculus; students must have a digital camera with manual control over shutter speed and aperture. No programming experience required.

3-4 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

3-4 units, Win (Johnson, M)

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, not given this year

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 193H. High Performance Web Sites
Best practices for speeding up web pages extracted from Google, Yahoo!, and other web sites. Students conduct experiments to quantify web performance. Prerequisites: JavaScript, CSS, and HTML.

3 units, Aut (Souders, S)

CS 193P. iPhone Application Programming
Tools and APIs required to build applications for the iPhone platform using the iPhone 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 APIs and tools including Xcode, Interface Builder and Instruments on Mac OS X. Other topics include: core animation, bonjour networking, 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.

3 units, Aut (Marcos, P)

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. Prerequisite: 108. GER:DB-EngrAppSci
3 units, Spr (Plummer, R)

CS 196. Microcomputer Consulting
Focus is on Macintosh and Windows system administration, maintenance and troubleshooting. Hardware and software 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 (Ly, J), Spr (Ly, J)

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; Kim, I; Thamrongrattanarit, A), Win (Sahami, M; Kim, I; Thamrongrattanarit, A), Spr (Sahami, M; Kim, I; Thamrongrattanarit, A)

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
1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN COMPUTER SCIENCE

Primarily for graduate students or advanced undergraduates.

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, Spr (Genesereth, M)

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 205B. Mathematical Methods for Fluids, Solids, and Interfaces
Numerical methods for simulation of problems involving solid mechanics and fluid dynamics. Focus is on practical tools needed for simulation, and continuous mathematics involving nonlinear hyperbolic partial differential equations. Possible topics: finite element method, highly deformable elastic bodies, plasticity, fracture, level set method, Burgers' equation, compressible and incompressible Navier-Stokes equations, smoke, water, fire, and solid-fluid coupling. Prerequisite: 205A or equivalent.
3 units, Spr (Fedkiw, R)

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, machine learning, neural networks, vision, robotics, and natural language understanding. Prerequisites: 103 or 103B; 106B or 106X; and exposure to probability. Recommended: 107 and facility with basic differential calculus.
3-4 units, Win (Ng, A)

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. Recommended: modal logic; game theory.
3 units, Spr (Shoham, Y)

CS 223A. Introduction to Robotics
Topics: robotics foundations in kinematics, dynamics, control, motion planning, trajectory generation, programming and design. Recommended: matrix algebra.
3 units, Win (Kolarov, K)

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 (Thrun, S)

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, but emphasis is on conceptual matters and theoretical foundations. Prerequisites: basic probability theory and first-order logic.
3 units, Aut (Shoham, Y)

CS 224N. Natural Language Processing
(Same as LINGUIST 280.) 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: CS 121/221 or CS124/LINGUIST 180, CS103, CS109.
3-4 units, Spr (Manning, C)

CS 224S. Speech Recognition and Synthesis
(Same as LINGUIST 281.) 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, Win (Jurafsky, D)

CS 224U. Natural Language Understanding
(Same as LINGUIST 188, LINGUIST 288.) Machine understanding of human language. Computational semantics (determination of sense, event structure, thematic role, time, aspect, synonymy/meronymy, causation, compositional semantics, treatment of scopal operators), and computational pragmatics and discourse (coherence relations, anaphora resolution, information packaging, generation). Theoretical issues, online resources, and relevance to applications including question answering, summarization, and textual inference. Prerequisites: one of LINGUIST 180, CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150).
2-4 units, alternate years, not given this year

CS 225A. Experimental Robotics
Hands-on. Topics: kinematic and dynamic control of motion, compliant motion and force control, sensor-based collision avoidance, motion planning, dynamic skills, and robot-human interfaces. Limited enrollment. Prerequisite: 223A.
3 units, not given this year

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 226. Statistical Techniques in Robotics
For students seeking to develop robust robot software and those interested in real-world applications of statistical theory. Probabilistic state estimation, Bayes filters, Kalman filters, information filters, and particle filters. Simultaneous localization and mapping techniques, and multi-robot sensor fusion. Markov techniques for making decisions under uncertainty, and probabilistic control algorithms and exploration.

3 units, Spr (Staff)

CS 227. Reasoning Methods in Artificial Intelligence
Technical presentation of logical algorithmic techniques for problem solving in AI. Combines formal algorithmic analysis with a description of recent applications. Topics: representation and modelling, propositional satisfiability, constraint satisfaction, planning and scheduling, advanced topics. Focus is on recent results. Prerequisites: familiarity with basic notions in data structures and with techniques in algorithm design and analysis. Recommended: previous or concurrent course in AI.

3 units, Spr (Yorke-Smith, N)

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. (Genesereth)

3 units, Spr (Genesereth, M)

CS 228. Structured Probabilistic Models: Principles and Techniques
Probabilistic modeling languages for representing complex domains, algorithms for reasoning and decision making using these representations, and learning these representations from data. Focus is on probabilistic graphic models, including Bayesian and Markov networks, extensions to temporal modeling such as hidden Markov models and dynamic Bayesian networks, and extensions to decision making such as influence diagrams. Basic techniques and their applications to 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 units, Win (Koller, D)

CS 228T. Structured Probabalistic Models: Theoretical Foundations
For students interested in advanced methods in machine learning and probabilistic AI. Theoretical foundations and extension for the ideas and algorithms covered in CS 228. Topics include theory and advanced algorithms for approximate inference in graphical models, representation and inference in continuous processes, and theory and algorithms for learning with missing data and hidden variables. Pre- or corequisites: CS 228; strong mathematical foundation.

2-3 units, Win (Koller, D)

CS 229. Machine Learning
Topics: statistical pattern recognition, linear and non-linear regression, non-parametric methods, exponential family, GLIMs, 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 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, Aut (Engler, D), Spr (Engler, D)

CS 240C. Advanced Operating Systems Implementation
Operating system techniques for meeting the performance, security, flexibility, and robustness needs of demanding applications. Review of hardware/software interface and traditional operating system concepts. Recent operating systems research. Lab to apply concepts. Students work with a minimal operating system capable of running on standard PC hardware. Operating system written in C with some assembly. Prerequisite: 140 or consent of instructor. (Mazieres)

3 units, not given this year

CS 240D. Distributed Storage Systems
File system implementation, low-level database storage techniques, and distributed programming. File system structures, journaling and logging, I/O system performance, RAID (redundant arrays of inexpensive disks), remote procedure call abstraction, and systems illustrating these concepts. File systems, distributed computing, replication and consistency, fault tolerance, and crash recovery. Programming assignments. Final project to build a functioning Unix file system. Prerequisites: C++ and familiarity with Unix; 140 or consent of instructor. (Mazieres)

3 units, not given this year

CS 240E. Low Power Wireless System Software
The structure and implementation of software systems for low power embedded sensors; how to build software that can run unattended for years on small batteries. Topics: hardware trends, energy profiles, execution models, aggregation, storage, application requirements, allocation, power management, resource management, scheduling, time synchronization, programming models, software design, and fault tolerance. Students build working systems on TinyOS, a low-power embedded operation system.

3 units, not given this year

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 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)

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. Prerequisite: 249A. Corequisite: 244A.

3 units, Spr (Cheriton, D)

CS 244C. Readings and Projects in Distributed Systems
Companion project option for 244B. Corequisite: 244B.

3-6 units, Spr (Guibas, L)

CS 244E. Low Power Wireless Networking
Challenges of low power wireless networking protocols and applications. Topics: the OSI model, 802.11, Bluetooth, 802.15.4, Zigbee, 6lowpan, hardware considerations, traffic patterns, media access (CSMA, TDMA, RTS/CTS, idle listening), DSSS, UWB, radio propagation models, cross-layer interactions, flooding, dissemination, gossip, epidemics, probabilistic approaches, global versus local communication, and in-network processing. Students read papers and build working protocols on TinyOS, a low-power embedded operating system.

3 units, not given this year

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), Sum (Staff)

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 (Winograd, T)

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 (Winograd, T)

CS 248. Introduction to Computer Graphics
(Only one of 148 or 248 counts towards any CS degree program.) Input and display devices, scan conversion of geometric primitives, 2D and 3D geometric transformations, clipping and windowing, scene modeling and animation, algorithms for visible surface determination, local and global shading models, color, and real-time rendering methods. Written assignments and programming projects. Prerequisites: 108, MATH 103 or equivalent.

3-5 units, Aut (Levoy, M)

CS 249A. Object-Oriented Programming from a Modeling and Simulation Perspective
Topics: large-scale software development approaches, encapsulation, use of inheritance and dynamic dispatch, design of interfaces and interface/implementation separation, exception handling, design patterns, minimalizing dependencies and value-oriented programming. The role of programming conventions/style/restrictions in surviving object-oriented programming for class libraries, frameworks, and programming-in-the-large; general techniques for object-oriented programming. 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
How to produce reasonable-cost, high quality software such as next-stage, large-scale systems that handle life-critical systems. Software process, people, practice, and audit: integrating invariant checks with production software; collection implementation; generic programming and templates; design of value types; named descriptions for large value types; memory management; controlling placement; locality and consumption; concurrency with modular object-oriented programming. Inheritance: when and why multiple inheritance naming, directories, manager, and other design patterns.

3 units, Win (Cheriton, D)

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, Win (Manna, Z)

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, Win (Manna, Z)

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, Win (Mitchell, J)

CS 259. Security Analysis of Network Protocols
Hands-on experience in formal methods to verify and evaluate the security of network protocols and other systems. Common security protocols and their properties including secrecy, authentication, key establishment, and fairness. Topics: standard formal models and tools used in security protocol analysis; their advantages and limitations. Fully automated, finite-state, model-checking techniques. Constraint solving, process algebras, protocol logics, probabilistic model checking, and game theory. Students select a protocol or secure system to analyze, specify it in the chosen model, use a formal analysis tool to verify its properties, and present findings.

3 units, not given this year

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 (Staff)

CS 270. Introduction to Biomedical Informatics: Fundamental Methods

(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, Aut (Musen, M)

CS 271. Introduction to Biomedical Informatics: Principles of Systems Design

(Same as BIOMEDIN 211.) Focus is on undertaking design and implementation of computational and information systems for life scientists and healthcare providers. Case studies illustrate what design factors lead to success or failure in building systems in complex biomedical environments. Topics: requirements analysis, workflow and organizational factors, functional specification, knowledge modeling, data heterogeneity, component-based architectures, human-computer interaction, and system evaluation. Prerequisite: 210, or consent of instructor.

3 units, Win (Das, A)

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: 210, 211 or 214, or consent of instructor.

3 units, Aut (Altman, R; Cheng, B; Klein, T)

CS 273A. A Computational Tour of the Human Genome

(Same as BIOMEDIN 273A, DBIO 273A.) Computational biology through an exploration of human genome. Key genetic concepts from a bioinformatics perspective. Biomedical advances resulting from sequencing of human and related organisms. Genome sequencing: technologies, assembly, personalized sequencing. Functional landscape: genes, regulatory modules, repeats, RNA genes. Genome evolution: processes, comparative genomics, ultraconservation, co-option. Additional topics: population genetics and personalized genomics, ancient DNA, and metagenomics.

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: algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, computing with networks of genes, 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, graphical display of biological data, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.

3-4 units, Spr (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, Win (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, Aut (Manning, C; 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, Spr (Staff)

CS 278. Systems Biology

(Same as BIOC 278, BIOE 310, CSB 278.) 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.

3 units, Aut (Covert, M; Dill, D; Brutlag, D; 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 interactions; 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 BIO 41; computer science and data structures at the level of CS 103 and 106; and probability and statistics at the level of STATS 116.

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. Social Software

Interface, systems, and algorithms concepts in designing social software including personalized home pages and social networks. Topics include collaborative filtering, user-generated content, search, social networks, actions, blogs, and controlled online experimentation.Team-based project.

3 units, Aut (Klemmer, S; Kamvar, S)

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. GER:DB-EngrAppSci
2-3 units, Spr (Aiken, A)

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, Aut (Sahami, M)

CS 300. Departmental Lecture Series
For first-year Computer Science Ph.D. students. 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 (Motwani, R)

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 309. Industrial Lectureships in Computer Science
Guest computer scientist. By arrangement. May be repeated for credit.
1 unit, not given this year

CS 309A. Software as a Service
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 give first-hand view of changes in the software industry.
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, Win (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, offered occasionally

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 generate 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, Win (Latombe, J)

CS 327A. Advanced Robotics
Emerging areas of human-centered robotics and interactive haptic simulation of virtual environments. Topics: redundancy; task-oriented dynamics and control, whole-body control-task and posture decomposition, cooperative robots, haptics and simulation, haptically augmented teleoperation, human-friendly robot design. Prerequisites: 223A or equivalent.
3 units, not given this year

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, offered 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, offered 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, Aut (Staff)

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, Aut (Levis, P)

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 (Staff)

CS 344. Build an Internet Router
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 team of three. How router interoperates with others in class. Open-ended design challenge judged by panel of industry experts. Prerequisites: 144, 244A, 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, not given this year

CS 345A. Data Mining
Algorithms for mining large-scale data, including data from the web and data maintained by web-based enterprises. Finding frequent itemsets and correlated items; web crawling; finding important web pages; link-spam detection; collaborative filtering; stream mining; clustering; optimizing ad selection; and virtual databases and extraction of relations from the web.
3 units, Aut (Ullman, J; Rajaraman, A)

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 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 (Widom, J)

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.
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
May be repeated for credit.
3 units, not given this year

CS 349W. Abstractions for Highly Interactive Web Applications
Web development basics, including HTML, Javascript, DOM, and Javascript. Toolkits for developing Web applications, such as Ruby on Rails and Django. Techniques for increasing the interactivity of web applications beyond simple forms, such as AJAX. Interaction styles in web applications.
3 units, Aut (Staff)

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, offered 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, not given this year

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 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, not given this 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, Aut (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
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, parallel and distributed algorithms, online algorithms, number-theoretic algorithms. Prerequisites: 161 or 261, STATS 116, or equivalents.
3 units, Aut (Motwani, R)

CS 369. Topics in Analysis of Algorithms
May be repeated for credit.
3 units, not given this year

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 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, Spr (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, alternate years, not given this year

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, 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, alternate years, 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 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 379Y. Interdisciplinary Design for Agile Aging
(Same as HUMBIO 131, MED 279Y.) Offered by the d.school. Perspectives from computer science, design, social and behavioral sciences, physiology, geriatrics, and biodesign to develop projects that address the potential of people to maintain vitality and mobility as they age. New ways to integrate computer and device technologies with behavioral and social interventions. Focus is on small-group projects based on real-world need finding. Prerequisite: background in one of design, computing, medicine, behavioral sciences, communications, or business.
3-4 units, Win (Winograd, C; Winograd, T; Friedlander, A; Yock, P)

CS 379Z. Design Project for Agile Aging
(Same as MED 279Z.) Second of two quarter sequence; students may take 379Y without 379Z; offered by the d.school. Small teams develop projects that can have an impact in the world through products, programs, and practices that affect people's health on a broad scale. Technical interventions, social and contextual design, organizational contexts, and business and distribution issues. Limited enrollment. Prerequisites: CS379Y, and master's level skills in one of design, computing, medicine, behavioral sciences, communications, or business.
3-4 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. (Motwani)
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 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 number 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 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, Spr (Winograd, T)

CS 448. Topics in Computer Graphics
Topic changes each quarter. Recent topics: exotic input and display technologies, graphics architectures, advanced rendering techniques, modeling shape and motion, data visualization, and computational photography. See http://graphics.stanford.edu/courses for offerings. May be repeated for credit. Prerequisite: 248 or consent of instructor.
3-4 units, not given this year

CS 448A. Topics in Computer Graphics: Computational Photography
Capabilities unique to digital cameras. Sensors; in-camera processing systems; the ability to refocus photographs after they are taken or to combine views taken with different camera settings, aim, or placement. New technologies for creating efficient, controllable illumination such as pulsed LEDs or video projectors; the ability to selectively illuminate objects, recolor a scene, or extract shape information. How these developments relax notions of what constitutes a photograph, blur the distinction between photography and scene modeling, and lead to new photographic techniques, scientific tools, and art forms. (Levoy)
3-4 units, not given this year

CS 448B. Topics in Computer Graphics: Special Topics in Visualization
Topic changes each quarter. Recent topics: exotic input and display technologies, graphics architecures, advanced rendering techniques, modeling shape and motion, data visualization, and computational photography. See http://graphics.stanford.edu/courses/ for current offerings.
1-3 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. Topics in Geometric Algorithms
Recent offerings include: shape matching, proximity and nearest-neighbor problems, visibility and motion planning, collision detection, geometric sampling methods, shape interpolation, and computational topology. May be repeated for credit. Prerequisite: 268, 368, or consent of instructor.
3 units, Aut (Memoli Techera, R), Win (Staff), Spr (Koltun, V)

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 528. Broad Area Colloquium for Artificial Intelligence, Geometry, Graphics, Robotics, and Vision
Weekly series of informal research talks on topics related to perceiving, modeling, manipulating, and displaying the physical world. The computational models and numerical methods underlying these topics. May be repeated for credit.
1 unit, not given this year

CS 531. Numerical Analysis/Scientific Computing Seminar
Research lectures by experts from academia, national laboratories, industry, and doctoral students. May be repeated for credit.
1 unit, not given this year

CS 541. Clean Slate Internet Research Seminar
How would a global communications infrastructure be designed starting from a hypothetical clean slate, given what is known now? How should the Internet look in 15 years? Research questions and ideas and approaches in subfields of with Internet design including network architecture, network security and robustness, mobile wireless networking, distributed services and systems, and theory-inspired network architecture. Guest speakers from Stanford and industry. See http://cleanslate.stanford.edu.
1 unit, alternate years, not given this year

CS 545. Database and Information Management Seminar
Current research and industrial innovation in database and information systems.
1 unit, Win (Widom, J)

CS 547. Human-Computer Interaction Seminar
Weekly speakers. May be repeated for credit.
1 unit, Aut (Winograd, T), 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 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, Win (Barbagli, F)

DANCE (DANCE) COURSES

For information on the Dance program, see the "Drama" section of this bulletin.

UNDERGRADUATE COURSES IN DANCE

DANCE 23. Public Performance
For students participating in Dance Division performances. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

DANCE 27. Faculty Choreography
Rehearsal and performance of faculty choreography. Selection by audition. May be repeated for credit.
2 units, Aut (Moses, R), Win (Moses, R), Spr (Moses, R)

DANCE 35. Feldenkrais for Performers
An educational system centered on movement, aiming to expand and refine the use of the self through awareness. Goal is to improve movement repertoire for dancers, musicians, artists, and those wishing to reduce pain or limitations in movement. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff)

DANCE 40. Introduction to Dance and Movement
Body expression, articulation, and anatomical basics through contemporary art dance. Emphasis is on development of awareness of the body in space. Exploration of improvisation and creativity. May be repeated for credit.
2 units, Spr (Moses, R)

DANCE 43. Liquid Flow: Introduction to Dance and Movement
Body expression, articulation, and anatomical basics through contemporary art dance. Emphasis is on development of awareness of the body in space. Exploration of improvisation and creativity. May be repeated for credit.
2 units, Win (Hayes, A)

DANCE 44. Beginning Modern Jazz
Basic techniques emphasizing current jazz style. Historical jazz steps enhance understanding of contemporary jazz forms. May be repeated for credit.
2 units, Aut (Moses, R)

DANCE 45. Improvisation Plus Contact
The development of improvisation skills as a creative performance practice and as a basis for choreography; techniques of contact improvisation. May be repeated for credit.
2 units, Aut (Kramer, 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. Fee. May be repeated for credit. (AU)
1 unit, Aut (Powers, R), Win (Powers, R), Spr (Powers, R)

DANCE 48. Beginning Ballet
Fundamentals of ballet technique including posture, placement, and the foundation steps of classical ballet. Emphasis is on the development of coordination, strength, and flexibility. May be repeated for credit.
2 units, Aut (Staff), Win (Staff)

DANCE 51. Congolese Dance
Open to all levels of dancers. Movements and choreography from Congo and W. African countries. Elements unique to African dance movement: body isolation, polyrhythmic movement, and body posture. Live drumming. May be repeated for credit.
2 units, not given this year

DANCE 56. Ballet Repertory: The Life and Work of Antony Tudor
The work of the 20th-century ballet choreographer Antony Tudor and his innovations in the dramatic and narrative possibilities of ballet. Studio work include class reenactment and phrase material from the Tudor repertoire. Lectures and video viewing. May be repeated for credit.
2 units, Spr (Elliott, K)

DANCE 57. Dance Repertory Projects
Students perform the work of faculty or visiting artist. Audition required. May be repeated for credit.
2 units, Win (Hayes, A), Spr (Moses, R)

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.
2 units, Spr (Reddick, R)

DANCE 100. Student Choreography: Studio to Stage
Student choreography is mentored to develop composition and performance skills, particularly for presentation in The American College Dance Festival. May be repeated for credit.
2 units, Win (Frank, D)

DANCE 101. Choreography: Solos and Duets
Skills to analyze and choreograph solo works. 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.
2 units, Aut (Moses, R)

DANCE 102. Choreography: Small Groups
Skills needed to choreograph duets and small group works. Students choreograph works. May be repeated for credit.
2 units, Win (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.
2 units, Spr (Frank, D)

DANCE 105. Contemporary Afro Styles and Dancemaking: Technique, Rhythm, Architecture
Current and traditional African diaspora styles. African polyrhythms, body percussion, and geometric forms, fused with postmodern concepts of composition and space. May be repeated for credit.
2 units, Win (Hayes, A)

DANCE 116. Figure and Ground: Site-Specific Performance in Outdoor Environments
Theory and practice, emphasizing historic and aesthetic context, critical analysis, and exploration of creative processes. May be repeated for credit.
2-3 units, not given this year

DANCE 133. History of the Waltz
From Vienna in 1800. Redowa and mazurka, waltz variations, the 20th-century hesitation waltz, Parisian valse musette, and 30s Boston and waltz swing. Studio technique with performance practice for stage. May be repeated for credit two times.
2 units, not given this year

DANCE 139. Liquid Flow: Intermediate Modern Dance
Contemporary dance technique incorporating internal energy forms drawn from martial arts, improvisation, composition, pedestrian and everyday movement, and critical thought in the contemporary dance art. May be repeated for credit.
2 units, Aut (Hayes, A)

DANCE 140. Intermediate Modern Dance
Intermediate technique. Improvisation and composition in directed studies. May be repeated for credit.
2 units, Spr (Frank, D)

DANCE 141. Advanced Modern Dance
Intermediate/advanced technique. Complex movement combinations emphasizing performance demands. May be repeated for credit.
2 units, Aut (Frank, D), Win (Frank, D), Spr (Frank, D)

DANCE 144. Intermediate Modern Jazz Dance
Emphasis is on alignment, control, rhythmic coordination, and contemporary mixture of styles. May be repeated for credit.
2 units, Win (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.
2 units, Aut (Powers, R), Spr (Powers, R)

DANCE 147. Living Traditions of Swing
Swing dancing: the early Lindy of the 20s; 6- and 8-count Lindy hop, shag, Big Apple. Partnering and improvisation. Swing's crosscultural influences and personal creativity. May be repeated for credit.
2 units, Win (Powers, R)

DANCE 148. Intermediate Ballet
Continuation of 48, repeating the fundamentals with increased complexity and introducing additional movement vocabulary. May be repeated for credit.
2 units, Win (Staff)

DANCE 149. Advanced Ballet
Professional-level class in a supportive environment. Comprehensive classical ballet technique including pointe work if the student desires. 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: hustle, waltz, redowa, tango, cha cha, salsa, samba. May be repeated for credit. Prerequisite: 146 or equivalent experience.
2 units, Win (Powers, R)

DANCE 160. Performance, Dance, and History
(Same as DRAMA 160, DRAMA 260.) Transitional periods in the history of theatrical and popular dance from the 19th through the 21st centuries; how the dancing body and choreography have been constructed in relation to social, aesthetic, and cultural agendas. This year, focus is on ballet migrations and the ballerina. GER:DB-Hum, EC-Gender
4 units, Win (Ross, J)

DANCE 161H. Dance and Live Art in the 20th and 21st Centuries
(Same as DRAMA 161H, DRAMA 261H.) History and development of postmodern dance and performance art. Topics include the body as art medium, performance art, experimental dance, and redefinitions of gender in live art
4 units, not given this year

DANCE 165. Geographies of Movement: Dance and the Politics of Space
(Same as DANCE 365.) Physical, philosophical and conceptual space of dance studies, considering traditional concert and ethnographic dance performances alongside and in relation to cultural movement practices. Viewings of movement events such as political gatherings, parades, pilgrimage, religious meetings, sports, protests, and festivals. How these performances challenge and produce new spatial imaginaries.
4 units, Spr (Staff)

DANCE 166. History of Social Dance in Western Culture
Movement and historic social dance from the past five centuries, including studio technique and history. Performance practices for stage, including deportment, body language, and demeanor distinctive to each era.
2 units, alternate years, not given this year

DANCE 169. Choreography: Creation, Staging, and Reconstruction
Skills and criteria for the choreographic process. Invention, staging, and reconstruction. The creative process and practical considerations in making a dance work.
2 units, not given this year

DANCE 170. Postmodern Road Trips: Viewing and Reviewing Contemporary Live Performances
Postmodern and post-postmodern histories in dance, performance, and contemporary artmaking practices at the intersection between performance and social practice. History and theory. Students attend performances and events on and off campus. GER:DB-Hum
4 units, Aut (Ross, J; Hayes, A)

DANCE 190. Special Research
Topics related to the discipline of dance. 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. GER:DB-Hum, EC-AmerCul
4 units, Spr (Ross, J)

DANCE 197B. 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. GER:EC-AmerCul
4 units, not given this year

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)

DANCE 365. Geographies of Movement: Dance and the Politics of Space
(Same as DANCE 165.) Physical, philosophical and conceptual space of dance studies, considering traditional concert and ethnographic dance performances alongside and in relation to cultural movement practices. Viewings of movement events such as political gatherings, parades, pilgrimage, religious meetings, sports, protests, and festivals. How these performances challenge and produce new spatial imaginaries.
4 units, Spr (Staff)

DEVELOPMENTAL BIOLOGY (DBIO) COURSES

For information on undergraduate and graduate programs in the Department of Developmental Biology, see the "Developmental Biology" section of this bulletin. Course and laboratory instruction in the Department of Developmental Biology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN DEVELOPMENTAL BIOLOGY

DBIO 156. Human Developmental Biology and Medicine
(Same as HUMBIO 141.) 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.
4 units, not given this year

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; Kim, S; Kingsley, D)

DBIO 202. Assisted Reproductive Technologies
(Same as 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; Behr, B)

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; Barsh, G; Sidow, A)

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; Fuller, M)

DBIO 215. Frontiers in Biological Research
(Same as BIOC 215, GENE 215.) Literature discussion in conjunction with the Frontiers in Biological Research seminar series

hosted by Biochemistry, Developmental Biology, and Genetics 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; Tan, M; Villeneuve, A), Win (Harbury, P; Tan, M; Villeneuve, A)

DBIO 221. Current Issues in Aging
(Same as GENE 221, NENS 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; Rando, T)

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.) Computational biology through an exploration of human genome. Key genetic concepts from a bioinformatics perspective. Biomedical advances resulting from sequencing of human and related organisms. Genome sequencing: technologies, assembly, personalized sequencing. Functional landscape: genes, regulatory modules, repeats, RNA genes. Genome evolution: processes, comparative genomics, ultraconservation, co-option. Additional topics: population genetics and personalized genomics, ancient DNA, and metagenomics.

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 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)

DIVISION OF LITERATURES, CULTURES, AND LANGUAGES (DLCL) COURSES

For information on the Division of Literatures, Cultures, and Languages, see the "Division of Literatures, Cultures, and Languages" section of this bulletin.

UNDERGRADUATE COURSES IN DIVISION OF LITERATURES, CULTURES, AND LANGUAGES

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 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, Spr (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.

3 units, Spr (Bernhardt, E)

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. The 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.

2 units, Aut (Springer, C), Spr (Fleishman, L)

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.

2 units, Aut (Greene, R), Win (Schnapp, J)

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.

2 units, Win (Surwillo, L)

DRAMA (DRAMA) COURSES

For information on undergraduate and graduate programs in the Department of Drama, see the "Drama" section of this bulletin.

UNDERGRADUATE COURSES IN DRAMA

DRAMA 9. Undergraduate Production Colloquium
For students researching, directing, and producing pieces for the Drama department or other student theater groups on campus. Issues related to theater venues, costs, design, construction, stage management, directing, and producing. Student and faculty presentations on production issues and the progress of their work. May be repeated for credit.

1-3 units, Aut, Win, Spr (Ramsaur, M)

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
4 units, Aut (Freed, A)

DRAMA 12N. Antigone: From Ancient Democracy to Contemporary Dissent
(F,Sem Same as CLASSGEN 6N.) Stanford Introductory Seminar. 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
4 units, Win (Rehm, R)

DRAMA 14N. Shakespeare from Stage to Screen
Stanford Introductory Seminar. Preference to freshmen. The texts, stage practices, and filmic transformations for Shakespearean plays, including Henry V, Hamlet, Midsummer Night's Dream, and Macbeth. Close readings of texts and films; the relationship of film technologies to the texts in the production of political and social space; and the cultural assumptions carried by images and characters. GER:DB-Hum
4 units, Win (Rayner, A)

DRAMA 16N. Beauty or the Beast? Kitsch and Contemporary Culture
Stanford Introductory Seminar. Preference to freshmen. What kind of esthetic experience does kitsch describe? Is it a matter of taste? Kitsch through disciplines such as visual arts, theater, literature, music, advertising, fashion, celebrity culture, and food. GER:DB-Hum
4 units, Spr (Jakovljevic, B)

DRAMA 17N. Salt of the Earth: The Docudrama in América
Stanford Introductory Seminar. Preference to freshmen. Docudrama as a form of dramatic writing which provides a social critique of current or historical events through creative documentation and dramatization. Sources include Chicana/o and Latina/o texts, Brecht, Teatro Campesino, and Culture Clash. Students produce a short docudrama. GER:DB-Hum, EC-AmerCul
3 units, Win (Moraga, C)

DRAMA 18N. Performing Religion and Secularity in the Modern World
Preference to freshmen. Why the increasingly globalized world is confronted with the concurrent rise in religious violence and extremism. The production of religion and secularity in the performative public sphere through a consideration of theater, films, religious processions, and festivals. How the axes of gender, class, and nation complicate religious identities in the modern world.
3-5 units, Win (Menon, J)

DRAMA 20. Acting for Non-Majors
Creative play and ensemble work. Skills including group improvisation to partner work. Freeing the natural voice and physical relaxation. Emphasis is on imaginative and creative impulses. Movement improvisation, listening exercises, and theater games. How to take risks that are the essence of free and powerful performance.
2 units, Aut (Bihr, J), Win (Bihr, J), Spr (Kostopoulos, K), Sum (Diaz-Sanchez, M)

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 26. Rock, Pop, Hip Hop
Performance genres in relationship to youth culture expressed in dance, songwriting, singing, fashion, acting, and rap. Workshop culminates in a collaborative performance.
1-2 units, not given this year

DRAMA 28. Makeup for the Stage
Techniques of makeup application for the artist and actor: aging, prosthetics, stylization, characterization, animals, and fantasy make-up.
2 units, Win (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. Introduction to Theatrical Design
Team-taught. The theatrical set, costume, and lighting design. Emphasis is on balancing practical skill with conceptual ideas and critical thought. Hands-on projects.
4 units, Aut (Gambatese, E; Ramsaur, M)

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 32. Costume Construction
Fabric techniques and processes for stage costumes.
2-3 units, Win (Strayer, C)

DRAMA 34. Stage Management Techniques
The production process, duties, and responsibilities of a stage manager. Skills needed to stage manage a production.
2-3 units, Aut (Apperson, L), Spr (Staff)

DRAMA 35. Introduction to Sound for the Theater
Lecture/lab. The practical handling of sound equipment, acoustics, and editing. Analysis, creation, and implementation of theatrical sound effects, live and recorded.
3-4 units, Win (Staff)

DRAMA 39A. Theater Performance: Scenery and/or Property
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 39B. Theater Performance: Lighting/Sound
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 39C. Theater Performance: Costumes/Makeup
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 39D. Theater Performance: Prosser Stage Management
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 42. Costume Construction
Lecture/lab.
2-3 units, alternate years, not given this year

DRAMA 77. Playwriting Workshop
Individual or small group work in play development extending from earlier classes. May be repeated for credit.
2-4 units, not given this year

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.
3-4 units, Aut (Jakovljevic, B)

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, Win (Klein, D), Spr (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. Identity, Diversity, and Aesthetics: The Institute for Diversity in the Arts
Students work with a visiting artist on art projects concerning diversity, culture, and race. Workshop. Service learning within a community population to probe diversity and social change through the arts. May be repeated for credit. GER:DB-Hum
5 units, Aut (Staff), Win (Elam, H), Spr (Staff)

DRAMA 120A. Fundamentals of Acting
For students who intend to begin serious actor training; 120A,B must be taken in sequence. The basic vocabulary of objective and action. Theater games and improvisation develop the ability to act with focus, intention, and energy. Basics of characterization and transformation. Outside rehearsal time required.
3 units, Aut (Kostopoulos, K), Win (Kostopoulos, K)

DRAMA 120B. Fundamentals of Acting
For students who intend to begin serious actor training. 120A,B must be taken in sequence. The actor's spontaneity and imagination are used to reveal the life of a play, working with dramatic texts. Approaches to the actor's craft include character biography and moment-to-moment truthful playing. Exercises including from Strasberg, Meisner, Chaikin, and Linklater. Scene and monologue work from primarily naturalistic plays. Outside rehearsal time required. Prerequisite: 120A or consent of instructor.
3 units, Spr (Freed, A)

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, Spr (Staff)

DRAMA 120V. Vocal Production and Audition
(Same as DRAMA 210V.) The vocal mechanism with development of voice and articulation for the stage. The actor's tools of phonetics, verbal action, and text analysis. Voice in preparation for audition. Emphasis is on relaxation, selection of appropriate material, and versatility to show contrast and range.
3 units, Aut (Kostopoulos, K)

DRAMA 121C. Acting: The Craft of Comedy
The basics of comedy playing, from its origins in the utterly truthful to its destination in the over-the-top. Characterization, mask, and exaggeration; class work on non-verbal scenes. The mechanics of comedy, timing, and clowning developed through improvisation and in-class exercises designed to free the imagination. Texts may include scenes from Feydeau, Woody Allen, Moss Hart, and Alan Ayckbourn.
3 units, alternate years, not given this year

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 121M. Movement and Character
Kinesthetic awareness and physical presence of the performer in relationship to others through techniques of focus, spatial intent, task, and choreographic improvisation.
3 units, Win (Bihr, J)

DRAMA 121P. Acting: Period and Style
Expanding the acting range through heightened language. Scenes from non-contemporary dramatic literature including texts from Shakespeare, Shaw, Turgenev, Ibsen, and Strindberg.
3 units, Spr (Kostopoulos, K)

DRAMA 121S. Acting Shakespeare Project
Intensive work on a shortened Shakespeare play leading to a studio performance project. Develops skills in understanding and performing Shakespeare, conducted as series of rehearsals, and culminating in group performance. The development of the voice, movement, and speaking skills necessary for demanding classical theater work. Prerequisites: 120A,B, or consent of instructor. Freed) alternate years, given 2002-03
3 units, Win (Bihr, J)

DRAMA 121W. Actors Who Write, Writers Who Act
The development of dramatic scripts for solo performance and multi-character plays. Work happens on its feet, with writing deadlines and an informal workshop environment in which students present scripts, with support and feedback in dramaturgy, and help with performance and staging issues.
3 units, not given this year

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 (Staff)

DRAMA 132. Costume Design
A visual analysis of the historical styles of costume design, interpreted for the modern theater and developed by the student in various presentational media. Prerequisite: 30 or consent of instructor.
4 units, Spr (Strayer, C)

DRAMA 133. Stage Scenery Design
Creations of increasing complexity involve text analysis, historical and artistic style, visual research, spatial organization, drafting, sketching, model building, and director-designer collaboration. Prerequisite: 30, or consent of instructor.
4 units, Win (Gambatese, E)

DRAMA 133C. Autocad for Designers
Fundamentals of computer-aided-design software. 2- and 3-dimensional drawing conventions; the use of line weight, color, composition, and graphic style. Creation of construction documents for real-world applications. Students create their own symbol library. May be repeated for credit.
3 units, Spr (Gambatese, E)

DRAMA 133P. Scenic Painting
Techniques of painting for the stage. May be repeated for credit.
2-3 units, not given this year

DRAMA 134. Stage Management Project
For students stage managing a Department of Drama production.
2-9 units, Aut (Apperson, L), Win (Staff), Spr (Staff)

DRAMA 135. Sound Design
All aspects of sound for the theater from equipment, acoustics, and editing to the creation of theatrical sound effects, live and recorded.
4 units, Win (Staff)

DRAMA 137. Drafting and Construction
Creation of working scenery drawings for departmental productions in preparation for construction in departmental scene shop.
2-3 units, not given this year

DRAMA 139. Stage Management Production Crew
May be repeated for credit.
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

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.
1-5 units, Aut (Ramsaur, M), Win (Staff), Spr (Staff), Sum (Staff)

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 154P. The California Performance Project-Multimedia and Research Workshop
Choreography and performance combined with interactive music and image making, haptic technology, and virtual worlds, Students creating a performance work to be staged virtually and in real time about California cultural and expressive history and social encounters.
3 units, Aut (Hayes, A), Win (Hayes, A), Spr (Staff)

DRAMA 155T. Drama of the Holocaust
(Same as DRAMA 255T.) The Holocaust as a recurrent theme in American, Israeli, and German drama; issues at the heart of the theatrical experience such as the role of theater as witness, representation of memories, and performance of real-life events on stage. Possible texts: Ghetto, The Investigation, Arbeit macht Frei, The Kastner Trial, and Bent. GER:DB-Hum
5 units, not given this year

DRAMA 156H. History of Performance Art and Live Art
(Same as DRAMA 256H.) From 1950 to the present, emphasizing the U.S. Precedents in visual arts, modern dance, and experimental theater. Modes include happenings, fluxus, body art, everyday performance, solo monologue, and bio art. Sources include surveys, essays, and artists' writings, and visual documentation.
3 units, not given this year

DRAMA 157T. Performance and Ethnography
(Same as DRAMA 257T.) Performance as a mode of engagement in fieldwork, as conceptual framework, and as a mode of representing cultural data. Readings from Clifford Geertz, Smadar Lavie, Dwight Conquergood, Victor Turner, Richard Schechner, Barbara Meyerhoff, Diana Taylor, Ruth Wilson Gilmore, Antonin Artaud, Soyini Madison, E. Patrick Johnson, Renato Rosaldo, Jon van Maanan, and Diane Wolfe.
5 units, not given this year

DRAMA 160. Performance, Dance, and History
(Same as DANCE 160, DRAMA 260.) Transitional periods in the history of theatrical and popular dance from the 19th through the 21st centuries; how the dancing body and choreography have been constructed in relation to social, aesthetic, and cultural agendas. This year, focus is on ballet migrations and the ballerina. GER:DB-Hum, EC-Gender
4 units, Win (Ross, J)

DRAMA 161H. Dance and Live Art in the 20th and 21st Centuries
(Same as DANCE 161H, DRAMA 261H.) History and development of postmodern dance and performance art. Topics include the body as art medium, performance art, experimental dance, and redefinitions of gender in live art
4 units, not given this year

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 163. Performance and America
(Same as DRAMA 263.) Dramas by women, men, Asian Americans, Latino Americans, and African Americans are examined with regard to the role of dramatic performance within contemporary American society, and as an affective and effective arena for inducing social change. GER:DB-Hum, EC-AmerCul
5 units, not given this year

DRAMA 165. Theater History: Classical to 1900
(Same as DRAMA 265.) A dramaturgical, historical, and design approach to the study of drama, theater, and performance. GER:DB-Hum
4 units, not given this year

DRAMA 166. Twentieth-Century Theater History: Production Research and Design
(Same as DRAMA 266.) A dramaturgical, historical, and design approach to the study of drama, theater, and performance. GER:DB-Hum
4 units, not given this year

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, not given this year

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 169. Contemporary European Performance
Postdramatic works of the 90s to the present by Socìetas Raffaello Sanzio, Forced Entertainment, William Forsythe, Jérôme Bel, Xavier LeRoy, Sasha Waltz, and Meg Stuart. Writings by artists, curators, dramaturgs and critical theorists.
3 units, Aut (Groves, R), offered occasionally

DRAMA 170A. Concepts of Directing
(Same as DRAMA 370.) Directorial definitions of time, space, movement, and the performer/spectator relationship. Experimentation with texts from literary and other sources, including works from the realistic tradition in drama, using a multi-form performance space.
5 units, Aut (Staff)

DRAMA 170B. Advanced Directing
Deconstructing and constructing. Tools for analyzing text and developing directorial concepts, and putting them into practice. Class exercises culminate in a short theater piece written and directed by the student. Prerequisite: 170A or consent of instructor.
4 units, Win (Staff)

DRAMA 170P. Composing Performance
(Same as DRAMA 323.) Workshop.Generating performance materials for solo and ensemble creative work.
3-5 units, Aut (Staff)

DRAMA 171. Undergraduate Theater Workshop
Undergraduate directors present one act plays in workshop performances. Credit available for actors and directors. Prerequisite: 170A/170B or consent of instructor.
1-4 units, Spr (Staff)

DRAMA 175. Bay Area Performance Platform: SFMOMA Project
In collaboration with Brian Conley from the California College of Art and SFMOMA, a seminar devoted to the issues raised by Rudolf Freiling's SFMOMA's fall exhibition, The Art of Participation: 1950 to Now. Students create projects focused on the museum as a site of education. May be repeated for credit.
3-5 units, Aut (Phelan, M)

DRAMA 176H. Dramaturgy Project: The Wasteland
(Same as DRAMA 276.) Piecing together a lost world, from which The Wasteland is a kind of surviving text, from other texts including the referenced literary works, art, music, and films of the early 20s, and the political and social history. The poem's cultural background that gave rise to it and was reflected in it.
1-3 units, Aut (Freed, A)

DRAMA 176P. Wasteland Practical
Creation and development of The Wasteland Project in collaboration with writers, actors, and directors.
1-2 units, Win (Kostopoulos, K)

DRAMA 177. Playwriting
(Same as DRAMA 277.) The autobiographical monologic and poetic possibilities in performance art explored to learn the elements of playwriting. 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.
5 units, Spr (Freed, A)

DRAMA 179D. Imagine Freedom: Dramatizing the Undocumented
(Same as DRAMA 279D.) The docudrama (plays and films) as an art practice of political transgression. Focus is on texts in which a socially marginalized community serves as the main character of the drama. Texts include *Salt of the Earth; Chavez Ravine* by Culture Clash; Canadian First Nation playwright Marie Clements' *The*

Unnatural and Accidental Women; and Doris Pilkington *Garimara's Rabbit Proof Fence*. Script analysis and scriptwriting. GER:DB-Hum

5 units, alternate years, not given this year

DRAMA 179F. Flor y Canto: Poetry Workshop
(Same as DRAMA 279F.) Poetry reading and writing. The poet as philosopher and the poet as revolutionary. Texts: the philosophical meditations of pre-Columbian Aztec poetry known as flor y canto, and reflections on the poetry of resistance born out of the nationalist and feminist struggles of Latin America and Aztlán. Required 20-page poetry manuscript. GER:DB-Hum

3-5 units, Spr (Moraga, C)

DRAMA 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
(Same as CSRE 179G, DRAMA 279G.) Gateway course for Institute for Diversity in Arts concentration. People of color aesthetics from contemporary art works in conversation with native (American, African, Asian) origins, gender, and sexuality; the formation of cultural identity. Final project.

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 units, Win (Rehm, R)

DRAMA 184Q. Devised Theater Project
Stanford Introductory Seminar. Preference to sophomores. Students create material through writing and performance exercises. Research; storyline and dramatic structure; preparation of the performance space, props, and costume pieces; and rehearse and performance. Guest professionals.

3 units, Win (Weber, C)

DRAMA 187Q. The Stage in Dialogue with History
Stanford Introductory Seminar. Preference to sophomores. The practice and ideological positions of European and American theater from the end of WW II to the implosion of the Soviet empire as seen in major playwrights and practitioners who shaped the European theater. Focus is on how plays and their staging responded to and tried to influence history. GER:DB-Hum

3 units, Aut (Weber, C)

DRAMA 189Q. Mapping and Wrapping the Body
Stanford Introductory Seminar. Preference to sophomores. The concepts behind gender boundaries and clothing systems. GER:DB-Hum

3 units, Aut (Eddelman, W)

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.

2-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 201A. Honors Colloquium
See "Undergraduate Programs" for description.

1 unit, Aut (Jakovljevic, B), Win (Jakovljevic, B), Spr (Jakovljevic, B), Sum (Staff)

DRAMA 201B. Honors Colloquium
See "Undergraduate Programs" for description.

1 unit, Aut (Jakovljevic, B), Win (Jakovljevic, B), Spr (Jakovljevic, B), Sum (Staff)

DRAMA 201C. Honors Colloquium
See "Undergraduate Programs" for description.

1 unit, Aut (Jakovljevic, B), Win (Jakovljevic, B), Spr (Jakovljevic, B), Sum (Staff)

DRAMA 201D. Honors Colloquium
See "Undergraduate Programs" for description.

1 unit, Aut (Jakovljevic, B), Win (Jakovljevic, B), Spr (Jakovljevic, B), Sum (Staff)

DRAMA 202. Honors Thesis
See "Undergraduate Programs" for description. May be repeated for credit.

2-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 203. Advanced Improvisation
Further development of improvisational skills.

3 units, not given this year

DRAMA 205. Senior Project: Acting
Collaborative work on a project culminating in a production.

2-5 units, not given this year

DRAMA 210A. Actor in Performance
Preference to Drama majors and minors and to students interested in further training in the performing arts. Taught in the professional conservatory tradition, with the creation of an acting ensemble. Skill building in acting, movement, voice, and speech. How to analyze and play the dramatic action of the text. Guest teachers from professional theater complement and expand the work of the ensemble. Limited enrollment. Prerequisite: interview with instructor.

4-5 units, alternate years, not given this year

DRAMA 210B. Actor in Performance
Preference to Drama majors and minors and to students interested in further training in the performing arts. Taught in the professional conservatory tradition, with the creation of an acting ensemble. Skill building in acting, movement, voice, and speech. How to analyze and play the dramatic action of the text. Guest teachers from professional theater complement and expand the work of the ensemble. Limited enrollment. Prerequisite: interview with instructor.

4-5 units, alternate years, not given this year

DRAMA 210C. Actor in Performance: Ensemble Workshop in Today's Theater
Actors apply themselves to performance challenges of plays from the U.S. and UK theater today: Stephen Adly Guirgis, Richard Greenberg, Philip Ridley, Kia Cothron, Diana Son, Winsome Pinnock, and emerging student playwrights. Final presentation of an adapted contemporary script chosen to suit the casting needs of the ensemble.

4-5 units, alternate years, not given this year

DRAMA 210V. Vocal Production and Audition
(Same as DRAMA 120V.) The vocal mechanism with development of voice and articulation for the stage. The actor's tools of phonetics, verbal action, and text analysis. Voice in preparation for audition. Emphasis is on relaxation, selection of appropriate material, and versatility to show contrast and range.

3 units, Aut (Kostopoulos, K)

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 219. Contemporary African American Drama: August Wilson, Suzan-Lori Parks, and Beyond
(Same as DRAMA 335.) From 1984 to the present. What constitutes African American drama; how contemporary playwrights confront intersections of race, gender; and sexuality; Blackness and historical constructions. How does the political and social climate affect the form and content of contemporary African American drama? How does the urgency of rap music translate into Hip Hop theater? Sources include critical and theoretical works on drama and contemporary African American cultural expression.

3-500 units, Spr (Elam, H)

DRAMA 224. Introduction to the Profession
Audition technique, material selection, and graduate school and MFA program guidance. Guest theater professionals. Selection and delivery of classical and contemporary audition material. Techniques for a confident approach to the audition situation.

3-5 units, given next year

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 (Ramsaur, M), Win (Ramsaur, M), Spr (Staff), 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.

1-5 units, Aut (Staff), Win (Staff), Spr (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.

1-5 units, Aut (Ramsaur, M), Win (Staff), Spr (Staff), Sum (Staff)

DRAMA 255T. Drama of the Holocaust
(Same as DRAMA 155T.) The Holocaust as a recurrent theme in American, Israeli, and German drama; issues at the heart of the theatrical experience such as the role of theater as witness, representation of memories, and performance of real-life events on stage. Possible texts: Ghetto, The Investigation, Arbeit macht Frei, The Kastner Trial, and Bent.

5 units, not given this year

DRAMA 256H. History of Performance Art and Live Art
(Same as DRAMA 156H.) From 1950 to the present, emphasizing the U.S. Precedents in visual arts, modern dance, and experimental theater. Modes include happenings, fluxus, body art, everyday performance, solo monologue, and bio art. Sources include surveys, essays, and artists' writings, and visual documentation.

3 units, not given this year

DRAMA 257T. Performance and Ethnography
(Same as DRAMA 157T.) Performance as a mode of engagement in fieldwork, as conceptual framework, and as a mode of representing cultural data. Readings from Clifford Geertz, Smadar Lavie, Dwight Conquergood, Victor Turner, Richard Schechner, Barbara Meyerhoff, Diana Taylor, Ruth Wilson Gilmore, Antonin Artaud, Soyini Madison, E. Patrick Johnson, Renato Rosaldo, Jon van Maanan, and Diane Wolfe.

5 units, not given this year

DRAMA 260. Performance, Dance, and History
(Same as DANCE 160, DRAMA 160.) Transitional periods in the history of theatrical and popular dance from the 19th through the 21st centuries; how the dancing body and choreography have been constructed in relation to social, aesthetic, and cultural agendas. This year, focus is on ballet migrations and the ballerina.

4 units, Win (Ross, J)

DRAMA 261H. Dance and Live Art in the 20th and 21st Centuries
(Same as DANCE 161H, DRAMA 161H.) History and development of postmodern dance and performance art. Topics include the body as art medium, performance art, experimental dance, and redefinitions of gender in live art

4 units, not given this year

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 263. Performance and America
(Same as DRAMA 163.) Dramas by women, men, Asian Americans, Latino Americans, and African Americans are examined with regard to the role of dramatic performance within contemporary American society, and as an affective and effective arena for inducing social change.

5 units, not given this year

DRAMA 265. Theater History: Classical to 1900
(Same as DRAMA 165.) A dramaturgical, historical, and design approach to the study of drama, theater, and performance.

4 units, not given this year

DRAMA 266. Twentieth-Century Theater History: Production Research and Design
(Same as DRAMA 166.) A dramaturgical, historical, and design approach to the study of drama, theater, and performance.

4 units, not given this year

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 276. Dramaturgy Project: The Wasteland
(Same as DRAMA 176H.) Piecing together a lost world, from which The Wasteland is a kind of surviving text, from other texts including the referenced literary works, art, music, and films of the early 20s, and the political and social history. The poem's cultural background that gave rise to it and was reflected in it.

1-3 units, Aut (Freed, A)

DRAMA 277. Playwriting
(Same as DRAMA 177.) The autobiographical monologic and poetic possibilities in performance art explored to learn the elements of playwriting.

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.

5 units, Spr (Freed, A)

DRAMA 279D. Imagine Freedom: Dramatizing the Undocumented
(Same as DRAMA 179D.) The docudrama (plays and films) as an art practice of political transgression. Focus is on texts in which a socially marginalized community serves as the main character of the drama. Texts include *Salt of the Earth; Chavez Ravine* by Culture Clash; Canadian First Nation playwright Marie Clements' *The Unnatural and Accidental Women;* and Doris Pilkington *Garimara's Rabbit Proof Fence*. Script analysis and scriptwriting.

5 units, alternate years, not given this year

DRAMA 279F. Flor y Canto: Poetry Workshop
(Same as DRAMA 179F.) Poetry reading and writing. The poet as philosopher and the poet as revolutionary. Texts: the philosophical meditations of pre-Columbian Aztec poetry known as flor y canto, and reflections on the poetry of resistance born out of the nationalist and feminist struggles of Latin America and Aztlán. Required 20-page poetry manuscript.

3-5 units, Spr (Moraga, C)

DRAMA 279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America
(Same as CSRE 179G, DRAMA 179G.) Gateway course for Institute for Diversity in Arts concentration. People of color aesthetics from contemporary art works in conversation with native (American, African, Asian) origins, gender, and sexuality; the formation of cultural identity. Final project.
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 (Rayner, A)

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, Win (Jakovljevic, B)

DRAMA 302. Racial Erotics
Issues in postcolonial studies; the shifting erotics of race and nation; and the management of sexuality within geopolitical contexts in colonialism, nationalism, and globalization. The historicity of these categories; how race, gender, and nation continue to shape the world.
3-5 units, Spr (Menon, J)

DRAMA 303. Race and Performance
How and if race is performed. Readings from W.E.B. DuBois, Michael Rogin, Paul Gilroy, Lisa Lowe, and Richard Dyer.
3-5 units, not given this year

DRAMA 303A. Theory/Theater
How theater has provided the ground for epistemological concerns with questions of being, events, human action, and ethics, from classical Greek thought to postcolonialism. Theoretical work including Aristotle, Artaud, Anzaldúa, Brecht, Bhabha, DuBois, and Derrida. Theater practices including perspectival staging and postmodern performance.
3 units, not given this year

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, not given this year

DRAMA 316V. Metaphysics and the Mise-en-scène
Theoretical paradigms of avant garde practices past and present.
3-5 units, Aut (Jakovljevic, B)

DRAMA 320. Basic Approaches to Teaching Acting
Workshop. The pedagogy of acting to prepare graduate student teachers for introductory classes in acting.
1-3 units, alternate years, not given this year

DRAMA 321. Proseminar
Workshop. Skills needed to participate in the academic profession including abstract, conference presentation, and dissertation or book chapter.
1-3 units, Aut (Phelan, M)

DRAMA 323. Composing Performance
(Same as DRAMA 170P.) Workshop.Generating performance materials for solo and ensemble creative work.
3-5 units, Aut (Staff)

DRAMA 335. Contemporary African American Drama: August Wilson, Suzan-Lori Parks, and Beyond
(Same as DRAMA 219.) From 1984 to the present. What constitutes African American drama; how contemporary playwrights confront intersections of race, gender; and sexuality; Blackness and historical constructions. How does the political and social climate affect the form and content of contemporary African American drama? How does the urgency of rap music translate into Hip Hop theater? Sources include critical and theoretical works on drama and contemporary African American cultural expression.
3-500 units, Spr (Elam, H)

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. Concepts of Directing
(Same as DRAMA 170A.) Directorial definitions of time, space, movement, and the performer/spectator relationship. Experimentation with texts from literary and other sources, including works from the realistic tradition in drama, using a multi-form performance space.
5 units, Aut (Staff)

DRAMA 372. Projects in Directing
Theatrical text and its transformation into performance. Textual analysis, research, evolution of a directorial concept, and its investigation in scene-work with actors. Students design and stage the production of a short play in a multi-form space. Public performance. May be repeated once for credit.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff)

DRAMA 372B. Projects in Directing
Theatrical text and its transformation into performance. Textual analysis, research, evolution of a directorial concept, and its investigation in scene-work with actors. Students design and stage the production of a short play in a multi-form space. Public performance. May be repeated once for credit.
3-5 units, not given this year

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, not given this year

DRAMA 374. Graduate Directors' Performance Project
Production of a full-length play, selected in consultation with faculty. Project is designed by graduate students, sometimes in collaboration with undergraduate design students, under the supervision of design faculty. Four to five weeks rehearsal. Public performance.
3-5 units, Aut (Ramsaur, M), Win (Ramsaur, M), Spr (Ramsaur, M), 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, Win (Staff)

DRAMA 376. Graduate Directors' Dramaturgy Project
Serve as a dramaturg on any department production. Work includes research on the production's text source, the writing of program notes, and the compilation and editing of the play bill. Possible adapting/editing of the performance text, and translating text from a foreign language.
2 units, Aut (Staff), Win (Staff), Spr (Staff), 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. Tutorial
1-9 units, Aut (Staff), Win (Staff), Spr (Moraga, C), Sum (Staff)

DRAMA 399. Dissertation Research
1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS STUDIES COURSES IN DRAMA

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN DRAMA COURSES

OSPBER 101A. Contemporary Theater
5 units, Spr (Kramer, K)

EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES (EEES) COURSES

For information on graduate programs in Earth, Energy, and Environmental Sciences, see the "Earth, Energy, and Environmental Sciences" section of this bulletin.

GRADUATE COURSES IN EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

EEES 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.
1 unit, Aut (Harris, J)

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, Spr (Staff)

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)

EARTH SYSTEMS (EARTHSYS) COURSES

For information on undergraduate programs in Earth Systems, see the "Earth Systems" section of this bulletin.

UNDERGRADUATE COURSES IN EARTH SYSTEMS

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 45N. Energy Issues Confronting the World
Stanford Introductory Seminar. Preference to freshman. Geologic, economic, and policy issues shaping energy use and contrasting human perceptions of energy security. Topics include discourse of resources, history and future of fossil fuels, curse of oil, global climate change, adaptation versus mitigation, relationship between wealth and energy, demand and strategies for efficiency and conservation, alternative energy prospects, geopolitics of energy trading, and energy flow among countries of the world. Game simulation, outside readings, class brainstorming, and student oral presentations on country energy profiles. GER:DB-NatSci
3 units, Win (Howell, D)

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.) Fossil and renewable energy resources: oil, natural gas, coal, nuclear, hydropower, solar, geothermal, biomass, wind, ocean energy, and energy efficiency. Topics for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. 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)

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 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, Aut (Myers, L), alternate years, not given next year

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. Environmental Economics and Policy
(Same as ECON 155.) 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)

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, Spr (Beroza, G; 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 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, alternate years, not given this year

EARTHSYS 132. Energy Cooperation in the Western Hemisphere

(Same as EARTHSYS 232, IPS 263.) 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, Spr (O'Keefe, T)

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, alternate years, not given this year

EARTHSYS 142. Remote Sensing of Land Use and Land Cover

(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, not given this year

EARTHSYS 144. Fundamentals of Geographic Information Science (GIS)

(Same as EESS 164.) 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 (Reilly, M)

EARTHSYS 147. Controlling Climate Change in the 21st Century

(Same as BIO 147, BIO 247, 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, Win (Schneider, S; Mastrandrea, M), alternate years, not given next year

EARTHSYS 152. Pathways Out of Rural Poverty

(Same as EARTHSYS 252, ECON 155B, IPS 261.) Determinants of rural poverty and historical pathways that have led the rural poor out of it. Policy perspectives: the macro level concerning overall economic growth and structural transformation; the sectoral level focusing on the role of agriculture in poverty reduction; and the household level focusing on individual characteristics and asset holdings, including human capital. The impact of globalization on pathways out of poverty and on agriculture and structural transformation in developing countries. Prerequisite: ECON 106 or 118 or EARTHSYS 180.

5 units, Spr (Timmer, C)

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 175. Law and Science of California Coastal Policy

(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.

3-4 units, Win (Boehm, A; Sivas, D; Caldwell, M)

EARTHSYS 180. Fundamentals of Sustainable Agriculture

(Same as BIO 180, BIO 280, EARTHSYS 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, Spr (Naylor, R), alternate years, not given next year

EARTHSYS 180B. Local Sustainable Agriculture
Field-based training in ecologically sound agricultural practices at the Stanford Community Farm; guest lectures from Bay Area farmers, agricultural educators, and food policy advocates; and a field trip to an educational farm. Weekly fieldwork led by an instructor with extensive organic farming experience. Topics include bed preparation, starting seedlings, composting, irrigation techniques, and harvesting methods. May be repeated for credit.

1 unit, Aut (Staff), Spr (Staff)

EARTHSYS 181. Concepts of Urban Agriculture
(Same as EARTHSYS 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. Prerequisite: application.

2 units, Win (Matson, P)

EARTHSYS 184. Climate and Agriculture
(Same as EARTHSYS 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, and consent of instructor.

3 units, Spr (Naylor, R; Lobell, D)

EARTHSYS 188. The Political Economy of Energy in India
(Same as EARTHSYS 288.) Seminar. How central, state, and local governments in India balance the competing goals of alleviating poverty, protecting the environment, and assuring the financial viability of India's energy companies. Case studies. Two-week field trip to India in June 2007 to visit industrial sites and meet with stakeholders in industry, government, and consumer advocacy. Prerequisite: application.

2-3 units, not given this year

EARTHSYS 189. Field Studies in Earth Systems
(Same as BIO 206.) 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, Spr (Chiariello, N; Dirzo, R; Field, C; Fendorf, S; Freyberg, D; Matson, P), alternate years, not given next year

EARTHSYS 195. Effectively Communicating Environmental Concepts
For seniors in the Earth Systems major only. How to communicate earth systems issues to non-experts. Audience-specific writing assignments, peer editing. WIM

4 units, Win (Staff)

EARTHSYS 199. Honors Program in Earth Systems

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 205. Political Economy of Energy Policy
Theoretical frameworks used by political scientists, sociologists, economists, and other intellectuals to understand how societies make and implement public policies related to energy and how the energy industry responds. Topics include theories of the state, monopoly and regulation, public choice, organizational behavior, international agreements, and innovation. Applications of those theories to energy policy issues, such as ethanol, climate change, energy security, the role of national oil companies in the world oil market, the functioning of OPEC, and the California electricity crisis. Prerequisite: application.

4 units, Win (Victor, D)

EARTHSYS 215. Free Trade, NAFTA, and the Environment
New forms of environmental governance stipulated within NAFTA policy. Topics include: theories of free trade, economic liberalization, and transnational environmental governance; green technology transfers; agricultural and industrial economies and implications for workers; transboundary conservation, water, and air quality issues in the N. American west.

4-5 units, Spr (Simon, G)

GRADUATE COURSES IN EARTH SYSTEMS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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, Aut (Myers, L), alternate years, not given next year

EARTHSYS 210. Senior Seminar
Oral and written communication skills. Each student presents results of the Earth Systems internship and leads discussion. Group project analyzing local environmental problems with Earth Systems approach.

3 units, Win (Kennedy, J)

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, alternate years, not given this year

EARTHSYS 232. Energy Cooperation in the Western Hemisphere
(Same as EARTHSYS 132, IPS 263.) 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, Spr (O'Keefe, T)

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, alternate years, not given this year

EARTHSYS 242. Remote Sensing of Land Use and Land Cover
(Same as EESS 162, EARTHSYS 142.) The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. 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, not given this year

EARTHSYS 247. Controlling Climate Change in the 21st Century
(Same as BIO 147, BIO 247, 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, Win (Schneider, S; Mastrandrea, M), alternate years, not given next 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 252. Pathways Out of Rural Poverty
(Same as EARTHSYS 152, ECON 155B, IPS 261.) Determinants of rural poverty and historical pathways that have led the rural poor out of it. Policy perspectives: the macro level concerning overall economic growth and structural transformation; the sectoral level focusing on the role of agriculture in poverty reduction; and the household level focusing on individual characteristics and asset holdings, including human capital. The impact of globalization on pathways out of poverty and on agriculture and structural transformation in developing countries. Prerequisite: ECON 106 or 118 or EARTHSYS 180.

5 units, Spr (Timmer, C)

EARTHSYS 260. Internship
Supervised field, lab, private sector, or advocacy project, normally through an internship sponsored by government agencies or research institutions, or independently developed by the student with the written approval of the Associate Director of Academics. 10-15 page report.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 275. Law and Science of California Coastal Policy
(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.

3-4 units, Win (Boehm, A; Sivas, D; Caldwell, M)

EARTHSYS 280. Fundamentals of Sustainable Agriculture
(Same as BIO 180, BIO 280, EARTHSYS 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, Spr (Naylor, R), alternate years, not given next year

EARTHSYS 281. Concepts of Urban Agriculture
(Same as EARTHSYS 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. Prerequisite: application.

2 units, Win (Matson, P)

EARTHSYS 284. Climate and Agriculture
(Same as EARTHSYS 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, and consent of instructor.

3 units, Spr (Naylor, R; Lobell, D)

EARTHSYS 288. The Political Economy of Energy in India
(Same as EARTHSYS 188.) Seminar. How central, state, and local governments in India balance the competing goals of alleviating poverty, protecting the environment, and assuring the financial viability of India's energy companies. Case studies. Two-week field trip to India in June 2007 to visit industrial sites and meet with stakeholders in industry, government, and consumer advocacy. Prerequisite: application.

2-3 units, not given this year

EARTHSYS 290. Master's Seminar
Open to Earth Systems master's students only. Independent research, oral presentation of results, and preparation of an original proposal for innovative Earth Systems science/policy research.

2 units, Win (Kennedy, J)

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. Advanced Topics in Earth Systems
For Earth Systems master's students only. Continuation of EARTHSYS 290. May be repeated for credit.

2 units, not given this year

EARTHSYS 299. M.S. Thesis

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EARTHSYS 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

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; Micheli, F), alternate years, not given next year)

OVERSEAS STUDIES COURSES IN EARTH SYSTEMS

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUSTRALIA EARTH SYSTEMS COURSES

OSPAUSTL 10. Coral Reef Ecosystems

3 units, Aut (Hoegh-Guldberg, O; Ward, S; Arrigo, K)

OSPAUSTL 20. Coastal Resource Management

3 units, Aut (Johnstone, R)

OSPAUSTL 30. Coastal Forest Ecosystems

3 units, Aut (Hall, J)

SANTIAGO EARTH SYSTEMS COURSES

OSPSANTG 58. Living Chile: A Land of Extremes

5 units, Aut (Reid, S), Win (Reid, S)

EAST ASIAN STUDIES (EASTASN) COURSES

For information on undergraduate and graduate programs in the East Asian Studies, see the "East Asian Studies" section of this bulletin. The courses listed below deal primarily with China, Japan, and/or Korea. Many other theoretical and methodological courses within the departments at Stanford are taught by faculty who are East Asian specialists. For instruction in East Asian languages, see the "Chinese Language," "Korean Language", and "Japanese Language" courses sections of this bulletin. For courses in Classical Chinese, see the "Chinese Literature" courses section of this bulletin.

UNDERGRADUATE COURSES IN EAST ASIAN STUDIES

EASTASN 5. East House Seminar
May be repeated for credit.
1 unit, Aut (Staff), Win (Sun, C), Spr (Sun, C)

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, Aut (Eggleston, K)

EASTASN 118. History, Memory, and Citizenship in East Asia
(Same as EASTASN 218.) Schooling and citizenship. Politics of historical memory. How ruling regimes have sought to create collective memories and inculcate values and ideologies through education, especially history and social studies, and controversies that have ensued. Japan, North and South Korea, Taiwan, Hong Kong, and China.
5 units, Win (Staff)

EASTASN 185C. Economic Development of Greater China: Past, Present, and Future
(Same as EASTASN 285C.) Historical stages, economic and political rationales, and effectiveness of the policies and institutional changes that have shaped China's economic emergence. China's economic reform and transition during the past 20 years. Application of economic theories of incentives, institutions, markets, and economic development. No knowledge of economics required.
3-5 units, Win (Rozelle, S)

EASTASN 186C. Origins of Writing in China
(Same as EASTASN 286C.) China is one of several world regions where writing emerged spontaneously without direct influence from literate cultures elsewhere. Archaeological and inscriptional evidence from the second millennium B.C.E.. Connections between early Chinese writing and administration, religion, and divination; similarities and differences with early literacy in the Near East; nature of the writing system and its history of decipherment. Chinese language not required.
5 units, Aut (Staff)

EASTASN 187C. Gender and Class in Post-Mao China
(Same as EASTASN 287C.) New forms of economic and gender inequality have emerged in the wake of China's post-Mao economic reforms. Departures from and continuities with the Maoist era. How ordinary Chinese, official state discourses, and scholarly observers understand and account for China's social transformation. Rural/urban divide; new elite and the middle class; rural to urban migration; transformations in femininity, masculinity, and family life; changing patterns of marriage, romance, and sexuality; the gendering of forms of work; the role of the state in everyday life; and changes in interpersonal morality and forms of sociality.
5 units, Win (Staff)

EASTASN 188C. Ideas, History, and Culture in Modern China
(Same as EASTASN 288C.) Political culture and intellectual tradition in modern and contemporary China. Roots of political imagination and cultural practices in traditional thinking; the modern Chinese state, society, and social movements. The decline of the public sphere in the contemporary world.
5 units, Win (Wang, H)

EASTASN 189K. Comparative Politics Perspective of the Two Koreas since 1945
(Same as EASTASN 289K.) Internal politics and external relations of the Democratic People's Republic of Korea and the Republic of Korea since 1948. The division of Korea and the Korean War, political changes from the First Republic to the Sixth Republic in the South, and the hereditary succession from Kim Il Sung to Kim Jung Il in the North. The rival political systems from the perspective of comparative politics. Success in the South and failure in the North: factors contributing to this difference. The North Korean nuclear issue. The future of North Korea-U.S. relations and inter-Korean relations; implications for international relations in E. Asia.
5 units, Aut (Kim, H)

EASTASN 191. Journal of East Asian Studies
1 unit, Aut (Sun, C), Win (Sun, C), Spr (Sun, C)

EASTASN 198. Senior Colloquium in East Asian Studies
Paper writing and presentation.
1 unit, Spr (Sun, C)

EASTASN 199. Directed Reading
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 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, Aut (Eggleston, K)

EASTASN 218. History, Memory, and Citizenship in East Asia
(Same as EASTASN 118.) Schooling and citizenship. Politics of historical memory. How ruling regimes have sought to create collective memories and inculcate values and ideologies through education, especially history and social studies, and controversies that have ensued. Japan, North and South Korea, Taiwan, Hong Kong, and China.
5 units, Win (Staff)

EASTASN 285C. Economic Development of Greater China: Past, Present, and Future
(Same as EASTASN 185C.) Historical stages, economic and political rationales, and effectiveness of the policies and institutional changes that have shaped China's economic emergence. China's economic reform and transition during the past 20 years. Application of economic theories of incentives, institutions, markets, and economic development. No previous knowledge of economics required.
3-5 units, Win (Rozelle, S)

EASTASN 286C. Origins of Writing in China
(Same as EASTASN 186C.) China is one of several world regions where writing emerged spontaneously without direct influence from literate cultures elsewhere. Archaeological and inscriptional evidence from the second millennium B.C.E.. Connections between early Chinese writing and administration, religion, and divination; similarities and differences with early literacy in the Near East; nature of the writing system and its history of decipherment. Chinese language not required.
5 units, Aut (Staff)

EASTASN 287C. Gender and Class in Post-Mao China
(Same as EASTASN 187C.) New forms of economic and gender inequality have emerged in the wake of China's post-Mao economic reforms. Departures from and continuities with the Maoist era. How ordinary Chinese, official state discourses, and scholarly observers understand and account for China's social transformation. Rural/urban divide; new elite and the middle class; rural to urban migration; transformations in femininity, masculinity, and family life; changing patterns of marriage, romance, and sexuality; the gendering of forms of work; the role of the state in everyday life; and changes in interpersonal morality and forms of sociality.
5 units, Win (Staff)

EASTASN 288C. Ideas, History, and Culture in Modern China
(Same as EASTASN 188C.) Political culture and intellectual tradition in modern and contemporary China. Roots of political imagination and cultural practices in traditional thinking; the modern Chinese state, society, and social movements. The decline of the public sphere in the contemporary world.
5 units, Win (Wang, H)

EASTASN 289K. Comparative Politics Perspective of the Two Koreas since 1945
(Same as EASTASN 189K.) Internal politics and external relations of the Democratic People's Republic of Korea (North Korea) and the

Republic of Korea (South Korea) since their inceptions in 1948. The division of Korea and the Korean War, political changes from the First Republic to the Sixth Republic in the South, and the hereditary succession in the North. The rival political systems from the perspective of comparative politics. Success in the South and failure in the North: factors contributing to this difference. The North Korean nuclear issue. The future of N. Korea-U.S. relations and inter-Korean relations; implications for international relations in E. Asia.

5 units, Aut (Kim, H)

EASTASN 330. Core Seminar: Issues and Approaches in East Asian Studies

For East Asian Studies M.A. students only.

1 unit, Aut (Sun, C)

ECONOMICS (ECON) COURSES

For information on undergraduate and graduate programs in the Department of Economics, see the "Economics" section of this bulletin.

UNDERGRADUATE COURSES IN ECONOMICS

ECON 150W. Economic Policy Analysis

(Same as SIW 123, PUBLPOL 104W.) Taught in Washington, DC; offered via distance learning to Stanford students on campus. Economics of evaluating and implementing public policies. Focus is on cost-benefit analysis, regulation, efficiency and equity, externalities, subsidies, public good provision, opportunity costs, the role of economic analysis in policy making, and how political institutions affect policy outcomes. Topics: climate change, telecommunications, defense and homeland security, controversial aspects of cost-benefit-analysis.

5 units, Aut (Wallsten, S)

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 (Wright, G), Sum (Lampe, R)

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 (Amador, M), Spr (Boskin, 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. Barriers to 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: 1 or 1A and MATH 51. GER:DB-Math

5 units, Aut (Abramitzky, R), Win (Kiesel, K), Spr (Tendall, 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 (Tendall, M), Win (Einav, L), Sum (Cojoc, D)

ECON 52. Economic Analysis III

Growth and fluctuations in the economic system as a whole. National income accounts and aggregate relationships among stocks and flows in markets for goods, labor, and financial assets. Economic growth, inflation, and unemployment. Role of macroeconomic policies in the short and long run. Prerequisites: 1B, 50.

5 units, Win (Jaimovich, N), Spr (Klenow, P), 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; emphasis is on reconstruction of economic events from published accounting reports.

5 units, Aut (Ogneva, M), Win (Stanton, F)

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. Analysis of variance. Heteroskedasticity, serial correlation, errors in variables, simultaneous equations. Prerequisites: 50, 102A or equivalent. Recommended: computer experience.

5 units, Win (Mahajan, A), Spr (Harding, M)

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. Individual projects. Topics vary with the instructor. Limited enrollment. Prerequisites: 52, 102B.

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)

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, Aut (Gould, A), 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.

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, Win (Hartmann, L)

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: American economic development in global and comparative context; origins and consequences of the American system of technology and business organization; economics of immigration; recent U.S. economic performance in historical perspective. Prerequisite: 1A. GER:DB-SocSci, EC-AmerCul

5 units, Spr (Wright, G)

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.

5 units, Spr (Etkes, H)

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 rather than case studies. Prerequisites: 50, 52, 102B. GER:EC-GlobalCom

5 units, Aut (Jayachandran, S)

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 122. Economic Development of Latin America
High crime levels as consequence and cause of underdevelopment in Latin America. Worldwide theory and evidence on the economics of criminal behavior and public enforcement. Emphasis is on economic determinants of crime, impact of public interventions, methodological issues to assess causality, and evidence from Latin America. Prerequisites: 50, 102B.

5 units, Win (Schargrodsky, E)

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, Win (Galetovic, A)

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. Elementary 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 (Staff)

ECON 135. Finance for Non-MBAs
(Same as FINANCE 221, 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. Limited enrollment; contact academic_operations@gsb.stanford.edu. 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.

4 units, Aut (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. Applications may include auctions for natural resources, sponsored search advertising, the medical residency match, and carbon trading markets. Prerequisite: 160.

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
Nature of economic risk and its effect on allocation of resources. Preferences among risky prospects: expected utility theory and the theory of risk aversion. Subjective versus objective probabilities. Market allocation of risk and the role of insurance markets under complete information. Insurance under asymmetric information, 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. Hedging credit risks. Prerequisites: 51, 102A.

5 units, not given this year

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: properties of various financial instruments including financial futures, mutual funds, the capital asset pricing model, and models for pricing options and other contingent claims. Prerequisites: 51, 102A.

5 units, Spr (Piazzesi, M), Sum (Gould, A)

ECON 141. Public Finance and Fiscal Policy
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.

5 units, Aut (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, 52.

5 units, Aut (Tertilt, M)

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: 50, 51, 102B. GER:EC-Gender

5 units, Win (DeGiorgi, G), Spr (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, Win (Hoxby, C)

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, Aut (DeGiorgi, G)

ECON 150. Economic Policy Analysis
(Same as 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, Spr (Staff)

ECON 151. Path Dependence in Private Action and Public Policy: Decision Making in the Shadow of History
(Same as PUBLPOL 130.) The historically contingent development of economic, social, and political behaviors at micro and macro levels. History's role in individual and organizational decision making. When can extraneous events have persisting effects upon public institutions, private organizations, and government agencies? Science and technology policy making; precedent-based judicial and administrative proceedings; and institutional reforms and regulatory initiatives illustrate positive feedback dynamics; self-organization and emergent properties in complex systems; conditions of lock-in to and escapes from sub-optimal equilibria in economic and social arrangements. Recommended: ECON 51.

3-5 units, Win (David, P)

ECON 153. Economics of the Internet
Applications of microeconomic theory to Internet businesses: auctions, online transactions, entry barriers, valuation, pricing of facilities, policy for broadband communications, network economics, standards, economics of information. Prerequisites: 51 and one of 102B, 103, 104, 113, 135, 137, 140, 149, 157, or 160.

5 units, not given this year

ECON 154. Economics of Legal Rules and Institutions
(Same as 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)

ECON 155. Environmental Economics and Policy
(Same as EARTHSYS 112.) 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 155B. Pathways Out of Rural Poverty
(Same as EARTHSYS 152, EARTHSYS 252, IPS 261.) Determinants of rural poverty and historical pathways that have led the rural poor out of it. Policy perspectives: the macro level concerning overall economic growth and structural transformation; the sectoral level focusing on the role of agriculture in poverty reduction; and the household level focusing on individual characteristics and asset holdings, including human capital. The impact of globalization on pathways out of poverty and on agriculture and structural transformation in developing countries. Prerequisite: ECON 106 or 118 or EARTHSYS 180.

5 units, Spr (Timmer, C)

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, Win (Kastl, J)

ECON 158. Antitrust and Regulation
The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: antitrust law and economics; the economics and practice of public utility regulation in the communications, transportation, and energy sectors; and the effects of licensing. Emphasis is on the application of economic concepts in evaluating the performance and policies of government agencies. Prerequisite: 51.

5 units, Spr (Hanson, W)

ECON 160. Game Theory and Economic Applications
Mathematical introduction to game theory and its applications to economics. Topics: strategic and extensive form games, Nash equilibrium, subgame-perfect equilibrium, Bayesian equilibrium, and perfect Bayesian equilibrium. The theory is applied to repeated games, auctions, and bargaining. Examples from economics and political science. Prerequisites: 51 and course in calculus, or consent of instructor.

5 units, not given this year

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 165. International Finance
Questions of current interest to policy makers, business leaders, and general public. Topics include 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. Models in international macroeconomics. Recent research on the empirical and practical relevance of these models. Tools to read critically and understand international economic policy found in popular media such as the Economist Magazine, the Wall Street Journal, and the Financial Times. Prerequisite: ECON 52.

5 units, Aut (Fitzgerald, D), Sum (Desmet, K)

ECON 166. International Trade
Comparative advantage in production and trade among nations; increasing returns, imperfect competition, and trade; the nature of the gains from trade, winners, and losers; international migration and multinational companies; trade policy and international trade agreements; theory and evidence. Prerequisite: 51.

5 units, Spr (Manova, K)

ECON 167. European Monetary and Economic Integration
The economics of the European Community and the internal market. Competition, transportation, and market policies, including problems of agriculture and unemployment. Fiscal harmonization and mercantilist rivalry. European Monetary Union: genesis, implementtation, 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. Topics in International Finance
(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, Spr (Taylor, J)

ECON 170. Intermediate Econometrics I
(Same as ECON 270. Graduate students register for 270; see 270.) 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 (Hansen, P; Hong, H)

ECON 171. Intermediate Econometrics II
(Same as ECON 271. Graduate students register for 271.) Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Limited enrollment. Prerequisite: 270.

5 units, Aut (Wolak, F)

ECON 172. Intermediate Econometrics III
(Same as ECON 272. Graduate students register for 272.) Continuation of 271. Nonlinear estimation, qualitative response models, limited dependent variable (Tobit) models. Limited enrollment. Prerequisite: 271.

2-5 units, Spr (Staff)

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 (Ogneva, M), Win (Stanton, F)

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 grasp of elements of multivariate calculus and linear algebra.
2-5 units, Aut (Pistaferri, L; Segal, I)

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 (Stein, L)

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
2-5 units, Win (Priebsch, M)

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 (Milgrom, P)

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 (Jaimovich, N; Amador, M)

ECON 211. Core Economics: Modules 11 and 12
Capital asset pricing models, equilibrium with securities, pricing of securities, and arbitrage. Overlapping generations models with incomplete market structure and sunspots. Foundations of Bayesian dynamic learning. 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. Limited enrollment. Prerequisite: 210.
2-5 units, Win (Tertilt, M)

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; Piazzesi, M)

ECON 214. Development Economics I
Microeconomic analysis of markets and institutions in developing countries. Topics: the role of the household; models of savings, credit, and risk; adjustment to aggregate shocks; occupational choice, credit constraints, and credit market imperfections; health and nutrition; new technology; and education. Emphasis is on empirical tests of and evidence for theoretical models. Prerequisites: 202 or 202N, 270.
2-5 units, Aut (Jayachandran, S)

ECON 216. Development Economics II
Consumption smoothing and insurance. Lack of enforceability and imperfect (partial) insurance. Social networks and informal institutions. Evaluation of policy interventions in developing countries. Joint liability and micro-credit. Institutions and the process of development.
2-5 units, Win (DeGiorgi, G)

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, Aut (Jackson, M)

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, Win (Harding, M)

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
The feedback structure of how technological change affects economic transformations and how scientific progress and economic change shape technological progress; conceptual and formal approaches for analyzing these relationships. Forecasting, economic history, and current techno-economic developments.
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, Aut (David, P)

ECON 227. European Economic History
From the Middle Ages to the 20th century. Topics include competing hypotheses in explaining cross-country differences in long-term economic growth; the formation, function, and persistence of institutions and organizations; the role of institutions and organizations, such as apprenticeship, servitude, partnerships, cooperatives, social networks, share cropping, and communes, as solutions to contractual problems; the economics of migration; the economics of the family. The use of economic theory in guiding hypothesis testing, the construction of new datasets, and the execution of empirical research.
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 of fluctuations and growth.

2-5 units, Aut (Tertilt, M)

ECON 234. Advanced Macroeconomics II
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; asset pricing in production economies; trading volume; international capital flows and financial market integration.

2-5 units, Win (Schneider, K)

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 (Bloom, N; Hall, R)

ECON 239D. Directed Reading
May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ECON 241. Public Economics and Political Economy I: Public Policy
Welfare economics. Effects of tax policy, including incidence and efficiency costs. Design of tax systems. Externalities, public goods, and clubs. Cost-benefit analysis. 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
Social insurance, comparative political institutions, and federalism. Prerequisites: 202, 203, 204, 210, 270, 271, or equivalent with consent of instructor. Recommended: 241.

2-5 units, Spr (Bernheim, D; Fitzpatrick, M)

ECON 244. Psychology and Economics
Experimental and field evidence related to the psychological mechanisms behind static choice, intertemporal choice, choice under risk and uncertainty, choice in social situations, and hedonics. Models of economic choice based on these findings, and how they improve the explanatory and predictive value of standard theories. Prerequisites: 204, 271, or consent of instructor.

2-5 units, not given this year

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
Topics in current applied microeconomic research including skill-biased technical change, income distribution, program evaluation, job search, migration, discrimination, consumption behavior, media bias, and management practices. Student and faculty presentations. Additional sessions on general presentation, paper writing, and research skills.

2-5 units, Spr (Pistaferri, L; Bloom, N)

ECON 250. Environmental Economics
Sources of environmental problems in market economies; policy options for addressing these problems. Topics include: alternative environmental policy instruments such as taxes, standards, and tradable permits; valuation of non-marketed commodities such as environmental amenities and biodiversity; and environmental policy making under uncertainty. Applications include global climate change and green tax reform. Prerequisites: 202, 203, 204, and 271, or equivalents with consent of instructor.

2-5 units, Aut (Goulder, L)

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, Win (Wolak, F)

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 2
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, Win (Wolak, F; Kastl, J)

ECON 260. Industrial Organization 3
Current research and policy interest. Topics may include: empirical tests of oligopoly theories; non-price competition; entry and market structure; the role of information in markets; auctions; e-commerce; dynamics of change in regulatory policy; theory of economics institutions; antitrust status of joint ventures; and use of capacity, innovation, and product variety as a barrier to entry. Significant unresolved research issues and promising ways to attack them. Prerequisites: 257, 258.

2-5 units, Spr (Levin, J; Einav, L)

ECON 265. International Economics I
International macroeconomics and finance, emphasizing current research. Prerequisites: 202, 203, 204, 210, 211, 212.

2-5 units, Aut (Fitzgerald, D)

ECON 266. International Economics II
Determinants of trade and comparative advantage. Trade with imperfectly competitive markets. Income distribution and gains from trade. Commercial policies, tariffs, and quotas. Dynamic comparative advantage. Economic geography and trade. Political economy of trade.

2-5 units, Spr (Manova, K)

ECON 267. Topics in International Trade
Firm-level approach to the decision to export focusing on firm heterogeneity. Firms' decision to invest abroad, and causes and effects of horizontal, vertical, and export-platform foreign direct investment. Trade and the organization of the firm: multi-product and multinational firms, and outsourcing. Trade patterns and institutional frictions, including credit constraints and labor market rigidities. Multilateralism versus preferential trade liberalization. Recent theoretical and empirical developments.

2-5 units, not given this year

ECON 268. Topics in International Finance
(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, Spr (Taylor, J)

ECON 270. Intermediate Econometrics I
(Same as ECON 170. Graduate students register for 270; see 270.) 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 (Hansen, P; Hong, H)

ECON 271. Intermediate Econometrics II
(Same as ECON 171. Graduate students register for 271.) Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Limited enrollment. Prerequisite: 270.
5 units, Aut (Wolak, F)

ECON 272. Intermediate Econometrics III
(Same as ECON 172. Graduate students register for 272.) Continuation of 271. Nonlinear estimation, qualitative response models, limited dependent variable (Tobit) models. Limited enrollment. Prerequisite: 271.
2-5 units, Spr (Staff)

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. Asymptotic hypothesis testing procedures derived for each estimation framework.
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.
3-4 units, Win (Romano, J)

ECON 276. Limited Dependent Variables
(Formerly 274.) Possible topics: discrete choice models; Tobit models; duration models; semiparametric methods; single index models; rank regression; U-statistics; bounds and incomplete models; linear and nonlinear static and dynamic treatment effects; local instrumental variables; matching; propensity score; inverse probability weighting; models with measurement errors and unobserved heterogeneity; stratified sampling. Discrete endogenous variables. Information theoretic alternative to gmm estimation. Nonlinear panel data. Prerequisite: 273 or consent of instructor.
2-5 units, Spr (Harding, M)

ECON 279. Experimental Economics
An introduction to experimental economics, its methods, and major subject areas that have been addressed by laboratory experiments. Focus is on a series of experiments that build on one another, and allow researchers with different theoretical dispositions to narrow the range of potential disagreement. Prerequisites: 202, 203, 204, 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
Issues and recent developments in mechanism design and the theory of contracts. Topics include: hidden characteristics and hidden action models with one and many agents, role of commitment and renegotiation in long-term relationships, incomplete contracts and applications to the theory of the firm.
2-5 units, Win (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.
4 units, Win (Skrzypacz, A)

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 290. Multiperson Decision Theory
(Same as MGTECON 608.) Students 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, Spr (Wilson, R)

ECON 291. Social and Economic Networks
Models and techniques for analyzing social and economic networks; how they are measured; and how to represent them. Models to understand how networks are formed; implications of network structure in social and economic behavior, including applications to labor markets, social mobility, crime, and consumer behavior.
2-5 units, given next 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 (Hansen, P; Bernheim, D), Spr (Bernheim, D; Hansen, P)

ECON 301. Microeconomic Workshop
1-10 units, not given this year

ECON 305. Economic Applications Workshop
1-10 units, Aut, Win, Spr (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Bloom, N; McClellan, M)

ECON 310. Macroeconomic Workshop
1-10 units, Aut, Win, Spr (Hall, R; Klenow, P; Taylor, J; Jaimovich, N; Tertilt, M; Amador, M; Kurz, M; Piazzesi, M; Schneider, K)

ECON 315. Development Workshop
1-10 units, Aut, Win, Spr (DeGiorgi, G; Mahajan, A; Jayachandran, S)

ECON 325. Economic History Workshop
May be repeated for credit.
1-10 units, Aut, Win, 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; Goulder, L; Hoxby, C), Win (Boskin, M; Shoven, J), Spr (Boskin, M; Shoven, J)

ECON 345. Applications Workshop
1-10 units, Aut (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Bloom, N), Win (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Bloom, N; McClellan, M), Spr (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Bloom, N; McClellan, M)

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), Win (Bresnahan, T; Einav, L), Spr (Bresnahan, T; Einav, L)

ECON 365. International Trade Workshop
1-10 units, Aut (Lau, L; Fitzgerald, D; Manova, K; Staiger, R), Win (Lau, L; Staiger, R; Wright, M; Fitzgerald, D), Spr (Lau, L; Wright, M; Fitzgerald, D; Staiger, R)

ECON 370. Econometrics Workshop
1-10 units, Aut, Win, Spr (Hansen, P; Mahajan, A; Hong, H; Harding, M)

ECON 385. Mathematical Economics Workshop
1-10 units, not given this year

ECON 391. Microeconomic Theory Seminar
Game theoretic (classic and evolutionary analysis of institutions as multiple equilibria). Norms, social embeddedness, organizations as conventions, contract enforcement and corporate governance mechanisms, and states. Institutional complementaries and diachronic institutional linkage. May be repeated for credit.
1-10 units, Aut (Segal, I; Levin, J; Milgrom, P; Niederle, M; Bernheim, D; Kurz, M; Jackson, M), Win (Bernheim, D; Levin, J; Milgrom, P; Niederle, M; Segal, I; Jackson, M; Kurz, M), Spr (Bernheim, D; Levin, J; Milgrom, P; Niederle, M; Segal, I; Jackson

ECON 400. Ph.D. Dissertation
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS STUDIES COURSES IN ECONOMICS

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING ECONOMICS COURSES

OSPBEIJ 24. China's Economic Development
5 units, Spr (Rozelle, S)

BERLIN ECONOMICS COURSES

OSPBER 115X. The German Economy: Past and Present
4-5 units, Aut (Klein, I)

OSPBER 161X. The German Economy in the Age of Globalization
4-5 units, Win (Klein, I)

FLORENCE ECONOMICS COURSES

OSPFLOR 46. International Monetary Economics
5 units, Spr (Cifarelli, G)

KYOTO ECONOMICS COURSES

OSPKYOTO 215X. The Political Economy of Japan
4-5 units, Spr (Hayashi, T)

MOSCOW ECONOMICS COURSES

OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia
5 units, Aut (Mau, V)

PARIS ECONOMICS COURSES

OSPPARIS 33. The Economics of Climate Change: Policies in Theory and Practice in the EU and the U.S.
5 units, Spr (de Perthuis, C; Keppler, J; Leguet, B)

OSPPARIS 91. Globalization and Its Effect on France and the European Union
5 units, Win (Le Cacheux, J; Laurent, E)

OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead
5 units, Aut (Le Cacheux, J; Laurent, E)

SANTIAGO ECONOMICS COURSES

OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies
5 units, Spr (Munoz, O)

OSPSANTG 130X. Latin American Economies in Transition
5 units, Aut (Briones, I)

OSPSANTG 160X. Latin America in the International Economy
5 units, Win (Staff)

EDUCATION (EDUC) COURSES

For information on graduate programs in the School of Education, see the "School of Education" section of this bulletin.

UNDERGRADUATE COURSES IN EDUCATION

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 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, SOC 103A, SOC 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. GER:DB-SocSci

4 units, Aut (Juel, C; England, P)

EDUC 103B. Sociocultural Theory and Practices: Race, Ethnicity, and Linguistic Diversity in Classrooms

(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, not given this year

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, Spr (Staff)

EDUC 107. The Politics of International Cooperation in Education

(Same as EDUC 307B. Undergraduates and master's students register for 107.) Analysis of policies and practices in international cooperation, assistance, and exchange. The role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs. (SSPEP/ICE, APA)

3-4 units, not given this year

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, not given this year

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.

5 units, Aut (Grossman, P; Wolf, J)

EDUC 112X. Urban Education

(Same as EDUC 212X. Graduate students register for 212X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education. GER:DB-Hum, DB-SocSci

3-4 units, Spr (Carter, P)

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. (Cotterman)

3 units, Spr (Cotterman, K; 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. (Antonio)

3 units, Spr (Antonio, A)

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

For education students interested in math and science curriculum development. Studio-based, hands-on approach to the research and development of technology tools and curriculum materials. Focus is on the role that technologies can play in teaching and learning in the content areas.

3-4 units, Win (Staff)

EDUC 130. Introduction to Counseling

The theories and techniques of counseling, emphasizing clients' individual and cultural differences, and construction of one's own theory of the counseling process and outcome. Two psychotherapeutic theories, cognitive-behavioral and existential-humanistic, supplemented with a third theory of student's choice. Experiential, problem-based focus on how to develop self-awareness and conceptual understandings of the counseling process in culturally diverse contexts. (PSE)

3 units, Win (LaFromboise, T)

EDUC 131. Mexdiation 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 (Massey, T)

EDUC 134. Career and Personal Counseling

(Same as EDUC 234, PSYCH 192.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with assessment instruments. Case studies of bicultural role conflict. Informal experience in counseling. (PSE)

3 units, not given this year

EDUC 137X. Social Justice in Education

(Same as EDUC 237X. Formerly 320X.) Recent work in political theory to address questions about social justice in educational policy and practice: equality in education, language rights, race and multiculturalism, educational choice. GER:EC-EthicReas

3 units, not given this year

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 equivalent, or consent of instructor. GER:EC-Gender

4 units, not given this year

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) GER:DB-Hum

3-5 units, Aut (Valdes, G)

EDUC 150. Introduction to Data Analysis and Interpretation

Primarily for master's students with little or no experience. 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 151. Introduction to Qualitative Research Methods

Primarily for master's students. Issues, ideas, and methods.

3-4 units, Aut (Pope, D), Win (Wolf, J)

EDUC 160. Introduction to Statistical Methods in Education

(Master's students register for 150.) For doctoral students with little or no prior statistics. Organization of data, descriptive statistics, elementary methods of inference, hypothesis testing, and confidence intervals. Computer package used. Students cannot also receive credit for PSYCH 60 or for STATS 60/160. (all areas)

3-4 units, Aut (Rogosa, D)

EDUC 165. History of Higher Education in the U.S.

(Same as 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)

3-4 units, Win (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 (Ball, A)

EDUC 167. Educating for Equity and Democracy

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 (McDermott, R)

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 JumpStart, 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, Spr (Valdes, G)

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, Aut (McLaughlin, M)

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 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.

2 units, Aut (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 (Brown, N)

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, Win (Simms, W)

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 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

4-5 units, Aut (Wotipka, C)

EDUC 198X. Tutoring with Adolescents: Ravenswood Writes

(Same as PWR 198X.) Strategies and approaches for teaching writing to students from diverse backgrounds and languages, and cultural and learning styles. Course prepares students to become tutors for Ravenswood Writes. Prerequisites: application and committee approval.

3 units, not given this year

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.

1 unit, Aut (Ramirez, F)

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 (Ramirez, F)

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 (Ramirez, F)

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 (Staff)

EDUC 245. Understanding Racial and Ethnic Identity Development

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, Aut (LaFromboise, T)

GRADUATE COURSES IN EDUCATION

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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.

3 units, Spr (Haertel, E)

EDUC 119X. Writing About Education

Workshop. How to communicate research and thinking in a clear and memorable way. The elements of good writing, word choice, and editing. Choosing the right publication for work; pros and cons of writing for a non-specialist audience; ethics, law, and libel; how to get published. Students write about their work and share their writing.

1-3 units, not given this year

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.

4-5 units, Win (Ramirez, F)

EDUC 144X. Child Development In and Beyond Schools

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, Sum (Staff)

EDUC 146X. Perspectives on 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.

3-5 units, not given this year

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 180S. Pre-field Course for Alternative Spring Break
Limited to students participating in the Alternative Spring Break program. See http://asb.stanford.edu for more inform
1 unit, not given this year

EDUC 185. Master's Thesis
(all areas)
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

EDUC 201. History of Education in the United States
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)
3-4 units, Aut (Gordon, L)

EDUC 201B. Education for Liberation
How ethnic, gender, and religious groups have employed education to advance group self-determination and autonomy throughout history. How reformers attempted to impose educational prescriptions on these groups.
3-4 units, not given this year

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, Win (Heath, S)

EDUC 203A. Tutoring: Seeing a Child through Literacy
(Same as EDUC 103A, SOC 103A, SOC 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.
4 units, Aut (Juel, C; England, P)

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, Aut (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 III: 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 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. (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, Spr (Willinsky, J)

EDUC 211. Master's Seminar in Social Sciences in Education
Limited to master's students in SSE. Hands-on forum. The process of developing and shaping a research program, integrating it with academic and field experiences, and building relationships beyond the program. Students conceptualize their projects and focus on researchable topics: effective revising and editing, job searches, working with your adviser, what next? or a celebration of achievements so far. (SSPEP)
1-3 units, not given this year

EDUC 212X. Urban Education
(Same as EDUC 112X. Graduate students register for 212X). 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, Win (Aubry, R)

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 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: Innovation and Discovery
How people recruit perceptual mechanisms (such as for navigating, learning about spatial relations such as driving a car, or inferring the behavior of novel device) to understand symbolic and conceptual domains. Do hands-on activities with physical objects promote the development of mathematical thinking? May be repeated for credit.

3 units, Aut (Schwartz, D)

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, Win (Loeb, S)

EDUC 220B. Introduction to the Politics of Education
(Same as GSBGEN 349.) 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, Spr (Bettinger, E)

EDUC 220C. Education and Society
(Same as 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, not given this year

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, Win (Loeb, S)

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, Win (McLaughlin, M)

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, Win (Cuban, L)

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.

3 units, Aut (Staff)

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 (Staff)

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 (Staff)

EDUC 229A. Learning Design and Technology Seminar
Four quarter seminar core of the LDT master's program. Designs for learning with technology. Issues and processes relating to internships and careers. Major learning, design, and technology project. Student navigate design sequences in learning environments rooted in practical problems. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (all areas)

1 unit, Aut (Staff)

EDUC 229B. Learning Design and Technology Seminar
Four quarter seminar core of the LDT master's program. Designs for learning with technology. Issues and processes relating to internships and careers. Major learning, design, and technology project. Student navigate design sequences in learning environments rooted in practical problems. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (all areas)

1 unit, Win (Staff)

EDUC 229C. Learning Design and Technology Seminar
Four quarter seminar core of the LDT master's program. Designs for learning with technology. Issues and processes relating to internships and careers. Major learning, design, and technology project. Student navigate design sequences in learning environments rooted in practical problems. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (all areas)

1 unit, Spr (Staff)

EDUC 229D. Learning Design and Technology Seminar
Four quarter seminar core of the LDT master's program. Designs for

learning with technology. Issues and processes relating to internships and careers. Major learning, design, and technology project. Student navigate design sequences in learning environments rooted in practical problems. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (all areas)

4-5 units, Sum (Staff)

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, Spr (Wei, J)

EDUC 232B. Introduction to Curriculum

What should American schools teach? How should school programs be organized? How can schools determine whether their goals have been achieved? What kind of school organization helps teachers improve their teaching? Historical and contemporary perspective on the curriculum of American schools. Interactions among curriculum, the organizational structure of schools, the conception of the teacher's role, and teaching and student learning assessment. Text, video analysis of teaching, and small group discussions. (CTE)

4 units, not given this year

EDUC 233A. Adolescent Development and Mentoring in the Urban Context

Students engage in an ongoing mentoring relationship with an adolescent from a youth-serving organization. The impact of culture on mentoring. Intervention with children and adolescents, forming positive connections, demonstrating empathy, learning culturally specific caring norms, participating in activities promoting positive youth development. Students are expected to maintain this relationship for at least one additional quarter.

3 units, Aut (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, Win (LaFromboise, T)

EDUC 234. Career and Personal Counseling

(Same as EDUC 134, PSYCH 192.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with assessment instruments. Case studies of bicultural role conflict. Informal experience in counseling. (PSE)

3 units, not given this year

EDUC 236B. Indigenous Latin America: Diversity and Governance

Debates on indigenous people's inclusion in modern Latin American democratic societies. Constitutions, national legislation, citizenry, role of education, and cultural diversity.

3-5 units, not given this year

EDUC 236X. Indigenous Peoples, Multiculturalism, and Education: Is Social Inclusion Possible in Latin America?

Existing forms of indigenous social organization based on tradition and ancient cosmology; the dynamics of change; and claims for participation and inclusion in present-day democratic societies in Latin America and their implications for the formal education system.

3-5 units, not given this year

EDUC 237X. Social Justice in Education

(Same as EDUC 137X. Formerly 320X.) Recent work in political theory to address questions about social justice in educational policy and practice: equality in education, language rights, race and multiculturalism, educational choice.

3 units, not given this year

EDUC 239. Emerging Issues in Child and Adolescent Development

Focus is on critical social and developmental issues that affect children and adolescents. Topics: divorce and single parenting, child care, poverty, sexuality, and mass media, emphasizing the impact of these conditions on normal development, education, and school-related social and cognitive performance. (PSE)

4 units, not given this year

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)

4 units, Aut (Darling-Hammond, L)

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, Aut (Denrell, J)

EDUC 241X. Organizational Learning

(Same as OB 384.) 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, Spr (Denrell, J)

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 (Staff)

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 (Costanzo, R)

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 (Staff)

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.

4 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 (Compton, C)

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.

4-7 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.

2 units, Win (Rutherford, S)

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, not given this year

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, Aut (Valdes, G)

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, not given this year

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 (Reardon, S)

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, Win (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, Spr (Shavelson, R)

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 254X. Leadership in Diverse Organizations
(Same as OB 393.) 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, AUt (Meyerson, D)

EDUC 256. Psychological and Educational Resilience Among Children and Youth
Psychological and educational theories of resilience as they relate to children and youth. Emphasis is on family, school, and community assets as they relate to protective factors that create conditions of resilience. How protective factors can be used to create healthy communities that enhance the life qualities of at-risk children and youth.
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 257C. 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, Spr (Reardon, S)

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, not given this year

EDUC 259X. Application of Hierarchical Linear Models in Behavioral and Social Research
(Same as OB 682.) Persistent methodological problems in the social sciences: the measurement of change and the assessment of multi-level effects or the unit of analysis problem. Their 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.) Statistical modeling in experimental and non-experimental settings, including misconceptions in social science applications such as causal models. Text is *Statistical Models: Theory and Practice*, by David Freedman. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods including multiple regression, logistic regression, and log-linear models.
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, Aut (Reich, R; Steyer, J)

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 (Grossman, P)

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 (Compton, C)

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 (Staff)

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 (Staff)

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, Aut (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 (Murata, A)

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.
3 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 (Staff)

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 (Staff)

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 (Staff)

EDUC 265. History of Higher Education in the U.S.
(Same as EDUC 165.) 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)
3-4 units, Win (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, Spr (Loeb, S)

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; Lythcott, J)

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 (Lythcott, 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 (Staff)

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 (Lythcott, 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 (Staff)

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 (Staff)

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)

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 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, Spr (Wotipka, C)

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, Win (Haertel, E)

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 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 18. (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, Aut (McLaughlin, M)

EDUC 279B. Youth Empowerment and Civic Engagement

(Same as EDUC 179B.) 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 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 285X. 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 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.

4 units, Aut (Drori, G)

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 (Barron, B), Win (Schwartz, D), 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, not given this year

EDUC 298. Online Communities of Learning

Historical foundations, theoretical perspectives, underlying learning theories, case studies, and enabling technologies of online learning communities across and within K-12 schools, among teachers, in professional collaborations in the sciences, and across informal communities of interest in society.

3 units, not given this year

EDUC 301B. Theoretical Debates in the History of Education

How and to what purpose should students be educated in America? What is an appropriate curriculum? Do all students deserve or need the same curriculum?

3-4 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 306A. Education and Economic Development

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 (Ramirez, F)

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 307B. The Politics of International Cooperation in Education
(Same as EDUC 107. Undergraduates and master's students register for 107.) Analysis of policies and practices in international cooperation, assistance, and exchange. The role of international organizations (World Bank, UNESCO, OECD) and the politics of multilateral and bilateral assistance programs. (SSPEP/ICE, APA)
3-4 units, not given this year

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 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, not given this year

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 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, Win (McDermott, M; Carter, P)

EDUC 316. Social Network Analysis
(Same as SOC 369.) The educational applications of social network analysis. 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 321A. Emerging Conceptions of Qualitative and Ethnographic Research
Issues of knowing via forms through which human beings have historically represented the world and how they care about it, including narrative, visual images, and poetry. How to see and represent the educational worlds. Sources include videotaped classrooms in action, film excerpts that reveal human relations, and literary forms that describe classroom situations. Materials and procedures used by researchers, film makers, and fiction writers.
4-5 units, not given this year

EDUC 321X. Leading Social Change: Educational and Social Entrepreneurship
(Same as OB 385.) Mechanisms of change and theories of action. Case studies; guest lecturers.
4 units, not given this year

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, not given this year

EDUC 323A. Introduction to Education Policy Analysis
The formulation and improvement of federal and state education and children policies. Key current policy issues and trends in politics. Topics: the federal role in education and child care. (SSPEP)
3 units, Win (Kelemen, M)

EDUC 324. Business Opportunities in Education
(Same as GSBGEN 545.) For students in the joint degree program in Business and Education; open to others. Changing market mechanisms and emerging technologies creating opportunities in for-profit education and training organizations. Interaction of firms with public sectors. Roles of public administrators, educators, investors, and technology providers in defining opportunities, challenges, and constraints for education and training firms. Approaches to strategy formation, product development, and operations. Guest experts. (SSPEP/APA)
2 units, not given this year

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 (McFarland, D; 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?
3 units, Spr (Labaree, D; Ramirez, F)

EDUC 327A. The Conduct of Qualitative Inquiry
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, not given this year

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 teacher, practice, and development; what gets developed in professional development; pedagogies of professional development; structures to support teacher learning; evaluating professional development; and policy issues. Field observation.
1-4 units, Spr (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)
3-5 units, Spr (Antonio, A)

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, Aut (McDermott, R; Goldman, S)

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, Win (Goldman, S)

EDUC 336X. 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. Sociocultural Theory and Practices: Race, Ethnicity, and Linguistic Diversity in Classrooms
(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, not given this year

EDUC 339X. 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, Win, 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, not given this year

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, Spr (Darling-Hammond, L)

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 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
(Same as GSBGEN 348.) 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 349X. Accountability and Assessment in Higher Education
Organizational report cards and accountability mechanisms: demand for and problems with them. Report cards as policy instruments; how they address information asymmetries; as alternatives to direct regulation; and current policy conditions that support them such as education standards and reform. Politics including interested audiences and organizational responses. An attempt to redesign an education report card.
3 units, not given this year

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 350B. 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)

2-3 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 as central to empirical research on learning and development. Topics: growth models, measurement of change, reciprocal effects, stability, analysis of durations including survival analysis, and experimental and non-experimental group comparisons. See http://www.stanford.edu/~rag/. Prerequisite: statistics at the level of 257. (PSE)

3 units, not given this year

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 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, Aut (Haertel, E)

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. Emphasis is on building capacity for individual schools to make decisions, establishment of an inquiry process at the school level, use and availability of information, implementation and evaluation of decisions, parental involvement, and support of school-based decisions by districts. (SSPEP/APA)

4 units, Win (Staff)

EDUC 356. Memory, History, and Education
(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, Spr (Wineburg, S)

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 longstanding issues of epistemology, intellectual property, propriety, access, value, and responsibility within the scholarly community. Contexts include publishing, archiving, indexing, and networking.

3-4 units, Win (Willinsky, J)

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, not given this year

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, Aut (Murata, A)

EDUC 360. Action Research in Education
Introduction to the theory and practice of action research. Basic concepts and methods. The historical and ideological influences on this form of inquiry by teachers. Participants analyze action research reports and engage in a small-scale action-research project. (CTE)

3 units, not given this year

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.

1-5 units, Aut (McFarland, D), Win (McFarland, D), Spr (McFarland, D)

EDUC 363X. Research and Practice on Organizing Urban Schools for Improvement
(Same as OB 367.) This course is a Bass Seminar. For masters' and doctoral students in Education and GSB. Empirical research on urban school reform efforts, theoretical frameworks on student and adult learning, the sociology of work in schools, and social organization theory. How community context affects instructional coherence. Dynamics between school professionals and with parents. Authentic instruction and its effects. Case studies on reform implementation.

4 units, not given this year

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, crosscultural 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 units, Win (Staff)

EDUC 368. Cognitive Development in Childhood and Adolescence
Traditional and current research in cognitive development: changes within the individual from infancy through adolescence. Theoretical and empirical perspectives on research processes that explain developmental changes affecting how a human being thinks about and experiences the world.

3-4 units, Spr (Hakuta, K)

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, Win (Shavelson, R)

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 374. Research Workshop: 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 (Reich, R; Meverson, D), Win (Reich, R; Meyerson, D), Spr (Reich, R; Meyerson, D)

EDUC 375A. Seminar on Organizational Theory
(Same as 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, not given this year

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, 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, not given this year

EDUC 377B. Strategic Management of Nonprofits
(Same as STRAMGT 368.) 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 (Meehan, W)

EDUC 377C. Strategic Issues in Philanthropy
(Same as 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, Spr (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, not given this year

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, Aut (Staff)

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 (Staff)

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)

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)

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)
3 units, Win (Goldenberg, C)

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, Aut (Kim, H)

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 (Meyerson, D)

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, Spr (Wineburg, 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, Win (Staff)

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, Win (Carnoy, M)

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. (Antonio)
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 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)
3-5 units, Aut (Darling-Hammond, L)

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, not given this year

EDUC 466. Doctoral Seminar in Curriculum
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, Win (Grossman, P)

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 Non-Experimental Research
For second-year and later students with data analysis or research design activities including in dissertation planning or analysis. Readings and exercises developed around participating student research. Topics may include: multilevel data analysis; usefulness of structural equation models (path analysis); and implementation of matching methods and regression adjustments for comparing non-equivalent groups. Various computing customs accommodated. See http://www-stat.stanford.edu/~rag/ed493/. Prerequisite: intermediate statistical methods course work.
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

ELECTRICAL ENGINEERING (EE) COURSES

For information on graduate programs in the Department of Electrical Engineering, see the "Electrical Engineering" and "School of Engineering" sections of this bulletin.

ELECTRICAL ENGINEERING COURSE CATALOG NUMBERING SYSTEM

Electrical Engineering courses are typically numbered according to the year in which the courses are normally taken.

10- 99	first or second year
100-199	second through fourth year
200-299	mezzanine courses for advanced undergraduates or graduates
300-399	first graduate year
400-499	second or third graduate year
600-799	special summer courses

UNDERGRADUATE COURSES IN ELECTRICAL ENGINEERING

EE 10N. How Musical Instruments Work
Stanford Introductory Seminar. Preference to freshmen. Musical instruments as examples of science, engineering, and the interplay between the two. The principles of operation of wind, string, and percussion instruments. Concepts include waves, resonators, sound spectra and the harmonic structure of instruments, engineering design, and the historical co-development of instruments and the science and engineering that makes them possible. Prerequisites: high school math and physics. Recommended: some experience playing a musical instrument. GER:DB-EngrAppSci

3 units, Spr (Miller, D)

EE 14N. Things about Stuff
Stanford Introductory Seminar. Preference to freshmen. Most engineering curricula present truncated, linear histories of technology, but the stories behind disruptive inventions such as the telegraph, telephone, wireless, television, transistor, and chip are as important as the inventions themselves. How these stories elucidate broadly applicable scientific principles. Focus is on studying consumer devices; optional projects to build devices including semiconductors made from pocket change. Students may propose topics of interest to them. GER:DB-EngrAppSci

3 units, Aut (Lee, T)

EE 17N. Engineering the Micro and Nano Worlds: From Chips to Genes
Stanford Introductory Seminar. Preference to freshmen. Hands-on operation of microscopes and micro-fabrication tools in the Stanford Nanofabrication Facility, field trips to local companies engaged in the applications of micro/nanotechnologies, and guest speakers in microelectronics, MEMS, and bio- and nanotechnology. Prerequisites: high-school physics. GER:DB-EngrAppSci

3 units, Spr (Pease, R; Maluf, N)

EE 21N. What is Nanotechnology?
Stanford Introductory Seminar. Preference to freshmen. Possibilities and impossibilities of nanotechnology. Sources include Feynman's There's Plenty of Room at the Bottom, Drexler's Engines of Creation: The Coming Era of Nanotechnology, and Crichton's Prey. Assumptions and predictions of these classic works; what nano machinery may do; scenarios of a technology that may go astray. Prerequisites: high school math, physics and chemistry. GER:DB-EngrAppSci

3 units, Aut (Wong, P)

EE 23N. Imaging: From the Atom to the Universe
Stanford Introductory Seminar. Preference to freshmen. Forms of imaging including human and animal vision systems, atomic force microscope, microscope, digital camera, holography and three-dimensional imaging, telescope, synthetic aperture radar imaging, nuclear magnetic imaging, sonar and gravitational wave imaging, and the Hubble Space telescope. Physical principles and exposure to real imaging devices and systems. GER:DB-EngrAppSci

3 units, Spr (Hesselink, L)

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 60N. Man versus Nature: Coping with Disasters Using Space Technology
(F,Sem Same as GEOPHYS 60N.) Stanford Introductory Seminar. Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. 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 (Wong, S)

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. GER:DB-EngrAppSci

4 units, Win (Wong, S)

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, Aut (Howe, R), Spr (Howe, R)

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. Stability and causality in linear systems. Laplace transforms and Bode plots. Feedback and control system design. Applications include radar, ultrasound imaging, fetal heart monitors, cell telephones, magnetic resonance imaging, and array antennas. Prerequisite: MATH 53 or ENGR 155A. GER:DB-EngrAppSci

4 units, Win (Pauly, J), Spr (Gray, R)

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 (Pauly, J), Spr (Kahn, J), Sum (Staff)

EE 106. Planetary Exploration

The other worlds of the solar system as revealed by their electromagnetic emissions and recent space missions. Comparative properties of the terrestrial and Jovian planets; planetary atmospheres, surfaces, interiors, and rings; planetary and satellite orbits and spacecraft trajectories; properties of interplanetary gas, dust, comets, and meteorites. Blackbody radiation and the basis for global warming. What the planets reveal about potential terrestrial catastrophes such as runaway greenhouse effect or collision with an asteroid or large comet. Origin and evolution of planetary systems. Remote sensing from spacecraft at radio, infrared, light, and ultraviolet wavelengths. Stanford EE department radio experiments. Prerequisite: one year of college engineering. GER:DB-EngrAppSci

3 units, Spr (Fraser-Smith, A)

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

3-4 units, Aut (Dally, W), Win (Mitra, S; Levis, P)

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 (Kozyrakis, C)

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 (Olukotun, O)

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. Integrated circuit technologies, circuit components, component variations, and practical design paradigms. Performance evaluation using computer-aided design tools. GER:DB-EngrAppSci

3 units, Aut (Dutton, R; Murmann, B)

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, photo-detectors). Introduction to quantum effects and band theory of solids. Prerequisite: ENGR 40. Corequisite: 101B. GER:DB-EngrAppSci

3 units, Spr (Peumans, P)

EE 118. Introduction to Mechatronics

Technologies involved in mechatronics (intelligent electro-mechanical systems) and techniques to integrate these technologies into mechatronic systems. Topics: electronics (A/D, D/A converters, op-amps, filters, power devices); software program design (event-driven programming, state machine based design); DC and stepper motors; basic sensing; mechanical design (machine elements and mechanical CAD). Lab component of structured assignments combined with large, open-ended team project. Limited enrollment. Prerequisites: ENGR 40, and CS 106A or 106X (preferred).

4 units, Win (Carryer, J)

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).

3 units, Spr (Giovangrandi, L)

EE 133. Analog Communications Design Laboratory

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. GER:DB-EngrAppSci

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, Spr (Solgaard, O)

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

4 units, Aut (Inan, U)

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, Win (Zebker, H)

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, Win (El Gamal, A)

EE 179. Introduction to Communications
Communication system design and performance analysis. 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, Spr (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)

EE 192C. Embedded Systems Engineering
From problem statement to final fabrication at the system level. Topics include: microprocessor architecture review; communication protocols (I2C, SPI EIA/TIA232, 422,485, CAN, OneWire); peripheral devices (timers, ADCs, DACs, human-computer interface); solid state storage (CF, MMC); OrCAD design tools; hardware-software interactions and design considerations; and real time operating systems (ROTS). Final design project from concept to PCB layout and firmware development.

3 units, not given this year

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 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: 114.

3 units, Win (Murmann, B; Wooley, 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 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, solutions of simple problems including quantum wells and tunneling. Quantum harmonic oscillator, coherent states. Calculation techniques including matrix diagonalization, perturbation theory, and variational method. Time-dependent perturbation theory, applications to optical absorption, nonlinear optical coefficients, and Fermi's golden rule. Quantum mechanics in crystalline materials. 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: angular momentum in quantum mechanics, spin, hydrogen atom, systems of identical particles (bosons and fermions), methods for one-dimensional problems, 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 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 (Peumans, P)

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, Spr (Fan, S)

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. Prerequisite: 142.
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. 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, Aut (Fan, S)

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 (Inan, U)

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 and 228 or equivalents. Recommended: basic quantum mechanics and lasers such as EE 216 and 231 or equivalents.
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, electro-absorption. Photodiodes: p-i-n, avalanche, responsivity, capacitance, transit time. Receivers: high-impedance, transimpedance, bandwidth, noise. Digital intensity modulation formats: non-return-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 or 261, and 242 or 235 or 241, and 178 or 179.
3 units, Aut (Kahn, J)

EE 248. Fundamentals of Noise Processes
Mathematical methods and physical principles: statistics, Fourier analysis, statistical and quantum mechanics. Circuit theory: thermal noise, quantum noise, fluctuation-dissipation theorem. Macroscopic and mesoscopic conductors. Macroscopic and mesoscopic p-n junctions. 1/f noise and random telegraphic noise. Negative conductance oscillators (lasers) and nonlinear susceptance oscillators (optical parametric amplifier). Optical and quantum communication systems. Weak force detection systems. Prerequisites: elementary device, circuit, and electromagnetic waves to the level of 101A,B and 242.
3 units, Aut (Yamamoto, Y)

EE 249. Introduction to the Space Environment
The environment through which space probes and vehicles travel and orbit, and which moderates solar gases and radiation. Experimentation in this environment, tools used; regions into which it is divided including ionosphere, magnetosphere, heliosphere, and interplanetary space. The role of the Sun, the effects of changes in solar activity, charged particle motion which in combination with the Earth's magnetic field leads to auroras and the Van Allen belts. Prerequisites: electromagnetics at the level of 242 and senior or graduate standing.
3 units, alternate years, not given this year

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 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, Spr (Inan, U)

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: Fourier series at the level of 102A, and linear algebra.
3 units, Aut (Osgood, B), Win (Staff), 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, alternate years, not given this year

EE 263. Introduction to Linear Dynamical Systems
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
Two sided Z-transform. Linear time invariant discrete time systems. Sampling theory; A/D and D/A conversion. Analog and digital filter

design. Quantization of signals and filter conefficients. Signal scaling. DFS, DFT, and sampling in the frequency domain. Interpolation and decimation. Oversampling techniques for ADC and DAC. Digital signal processing for wireless communications. Prerequisite: 102B. Recommended: 261, 278.

3 units, Aut (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, IIR filters, FIR filters, filter design and implementation, spectral analysis, rate conversion, wireless data communication, OFDM receiver design. Prerequisites: 102A,B. Recommended: 261.

3-4 units, Win (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 (Hesselink, L)

EE 271. Introduction to VLSI Systems
Large-scale MOS design. Topics: MOS transistors, static and dynamic MOS gates, MOS circuit fabrication, design rules, resistance and capacitance extraction, power and delay estimation, scaling, MOS combinational and sequential logic design, registers and clocking schemes, memory, data-path, and control-unit design. Elements of computer-aided circuit analysis, synthesis, and layout techniques. Prerequisites: 101A and 108B; familiarity with transistors, logic design, Verilog, and digital system organization.

3 units, Aut (Mitra, S)

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 (Staff)

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, FDD and TDD; multipath mitigation, OFDM, equalization, spread spectrum. 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. May be repeated for credit one time. Prerequisites: 178 or STATS 116, and linear systems and Fourier transforms at the level of 102A,B or 261.

3 units, Aut (Gray, R), Spr (El Gamal, A), 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
Advanced system-level architecture techniques for devices such as personal computers, servers, and embedded or portable systems. Topics such as cache hierarchies, memory systems, storage and IO systems, virtualization, clusters, fault-tolerance, and low-power design. Interactions between hardware and software layers in such systems. Performance analysis and optimization techniques for small- and large-scale systems. Principles such as locality, coarse-grain parallelism, overlapping communication and computation, performance/power trade-offs, and reliability. Prerequisite: 108B. Recommended: CS 140.

3 units, Aut (Kozyrakis, C)

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.

1 unit, Aut , Win , Spr , Sum (Wong, S)

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.

1 unit, Aut, Win, Spr, Sum (Wong, S)

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.

1 unit, Aut, Win, Spr, Sum (Wong, S)

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 293A. Fundamentals of Energy Processes
For seniors and graduate students. Thermodynamics, heat engines, thermoelectics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45

3-4 units, Aut (da Rosa, A)

EE 293B. Fundamentals of Energy Processes
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

3-4 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. Topics in 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, Spr (Meng, T; Shenoy, K)

EE 309. Semiconductor Memory Devices and Technology
Memory devices: SRAM, DRAM, NVRAM (non-volatile memory). Functionality and performance of ULSI systems. Semiconductor memories, device design considerations, device scaling, device fabrication, addressing, and readout circuits. Cell structures (1T-1C, 6T, 4T, 1T-1R, 0T-1R, floating gate FLASH, SONOS, NROM), and memory organization (open bit-line, folded bit-line, NAND, NOR, cross-point). New memory concepts such as nanocrystal memory, single-electron memory, magnetic tunnel junction memory (MRAM), ferroelectric memory (FRAM), phase change memory (PRAM), T-RAM, polymer memory, metal oxide memory, nanoconductive bridge memory). Prerequisite: 216. Recommended: 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: 216, 316.

1 unit, Win (Nishi, Y; Wong, P; Saraswat, K)

EE 311. Advanced Integrated Circuit Fabrication Processes
Practical and fundamental limits to the evolution of the technology of modern MOS devices. Modern device and circuit fabrication and likely future changes. Advanced techniques and models of device and back-end (interconnect and contact) processing. Use of TSUPREM4 and MEDICI for process and device modeling. MOS process integration. Prerequisites: 212, 216.

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
Analysis and design of digital MOS integrated circuits. Development of different models for MOS transistors and how to use them to analyze circuit performance. Use of computer-aided circuit analysis. Logic styles include static, dynamic and pass logic, pulse-mode gates, and current-mode logic. 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. Prerequisites: 101B, 108A. Recommended: 271.

3 units, Win (Horowitz, M)

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, passive and active filters, 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.

3 units, Spr (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, Win (Nishi, Y; Sze, S)

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. Prerequisites: undergraduate 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, semiclassical transport theory, semiconductor 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. Prerequisites: 216, 228.

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 ATLAS, 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 structure of surfaces and interfaces. Microscopic and atomic models of microstructures; applications such as within semiconductor device technology and catalysis. Physical processes of low energy electron diffraction, Auger electron spectroscopy, UV and X-ray photoemission spectroscopy, electron/photon stimulated ion desorption, inelastic tunneling spectroscopy, ion scattering, surface EXAFS, and energy loss spectroscopy; 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 335. Introduction to Information Storage Systems
State-of-the-art data storage technologies, including magnetic disk drive storage, optical data storage (CD-ROM, DVD, magneto-optic recording), solid state memory (flash memory, ferro-electric memory), and emerging technologies (magnetic random access memory, probe-based storage). Magnetic disk recording and comparisons among data storage technologies. Related nanotechnologies. Final presentation. Prerequisites: electromagnetism, optics, transistors, binary algebra, probability, and Fourier transform.

3 units, Win (Wang, S)

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. Sub-wavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: electromagnetic theory at the level of 242.

3 units, Win (Fan, S; Brongersma, M)

EE 340. Advanced Topics in Optics and Quantum Optics
Optical microcavities and their device applications. Types of optical microcavities (microdisks, microspheres, and photonic crystal 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 microcavities, including low-threshold lasers, resonant cavity light-emitting diodes, and single-photon sources. 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. Experimental investigation of key optical communications components including fibers, lasers, modulators, photodiodes, optical amplifiers, and WDM multiplexers and demultiplexers. Key optical communications systems techniques: eye diagrams and BER measurements. 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 (Harris, S)

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. Solitons, loss- and dispersion-managed solitons. Comparison of modulation techniques: duobinary, pulse-amplitude modulation, differential phase-shift keying, phase-shift keying, quadrature-amplitude modulation. Comparison of detection techniques: noncoherent, differentially coherent, coherent. Spectral efficiency limits. Error-control coding. 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, Win (Inan, U)

EE 353. 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 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: polarimetry and target

discrimination, topographic mapping surface displacements, velocities of ice fields.

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 Communication

Design, performance analysis, and performance limits of wireless systems. Topics include: current wireless systems, path loss and shadowing, statistical multipath channel models, capacity of wireless channels, digital modulation and its performance in fading and intersymbol interference, adaptive modulation, diversity, multiple antenna systems (MIMO), equalization, multicarrier modulation, and spread spectrum and RAKE receivers. Possible additional topics: multiuser system design issues such as multiple access, frequency reuse in cellular systems, and ad hoc wireless network design. Prerequisite: 279.

3-4 units, Win (Goldsmith, A)

EE 360. Multiuser Wireless Systems and Networks

Design, analysis, and fundamental limits. Possible topics include multiuser detection and interference cancellation, multiple access, cellular system design and optimization, Shannon capacity and achievable rate regions of wireless multiuser channels and networks, ad hoc wireless network design, sensor and energy-constrained networks, and cross-layer design. Prerequisite: 359.

3 units, not given this year

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, Win (Boyd, S)

EE 364A. Convex Optimization I

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, Spr (Boyd, S)

EE 364B. Convex Optimization II

Continuation of 364. Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Alternating projections. Exploiting problem structure in implementation. Convex relaxations of hard problems, and global optimization via branch and bound. Robust optimization. Applications in areas such as control, circuit design, signal processing, and communications. Substantial project. Prerequisite: 364A.

3 units, not given this year

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, linear image filtering and correlation, image transforms, eigenimages, multidimensional signals and systems, multiresolution image processing, wavelets, morphological image processing, noise reduction and restoration, simple feature extraction and recognition tasks, image registration. Students write and investigate image processing algorithms in Matlab. Competitive term project. Prerequisites: 261, 278.

3 units, not given this year

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

Issues in high performance digital CMOS VLSI design from a system perspective. Topics: wire modeling, logic families, latch design and clocking issues, clock distribution, RAMs, ALUs, I/O and I/O noise issues. Final project involves the design of a subsystem for a high-speed processor. Extensive use of SPICE. Prerequisites: 271 and 313, or consent of instructor.

3 units, Spr (Stark, D; Ho, R)

EE 373A. Adaptive Signal Processing

Self-optimizing systems whose performance is improved through contact with their environments. Feedback models for least mean-square adaptation processes. Steepest descent, Newton's method, and Southwell relaxation methods. Random search. LMS algorithm. Efficiency measures for adaptive processes. Adaptive digital filters, noise canceling and signal enhancement, adaptive antennas, adaptive control systems. Original theoretical and experimental research projects in electrical engineering and biomedical engineering, teamwork. Prerequisites: 263, 264. Recommended: 278.

3 units, Win (Widrow, B)

EE 373B. Adaptive Neural Networks

Adaptive threshold elements, feedfoward layered networks, back-propagation algorithm. Adaptive decision making. Adaptive gaming. Principal components analysis. Nonlinear adaptive filtering. Volterra adaptive filtering. Recurrent neural networks. Experimental and theoretical applications of neural networks to pattern recognition, speech recognition, and self-learning adaptive control systems. Reinforcement learning. Cognitive memory, human and machine. Original theoretical and experimental research projects in electrical engineering and biomedical engineering. Continuation of projects begun in 373A. Prerequisite: 373A.

3 units, Spr (Widrow, B)

EE 375. Quantization Noise

The effects of roundoff noise in digital computation, signal processing, control, and communication systems. Definition of the quantizer. Analog-to-digital and digital-to-analog conversion. Probability density functions, characteristic functions, and moments. Statistical analysis of quantization noise. General statistical relations between quantization noise, the quantizer input, and the quantizer output. Sampling and quantization of Gaussian and other time series. Linearization with additive dither signals. Quantization noise in feedback control systems, signal processing systems, FFT algorithm, linear and nonlinear systems, chaotic systems. Quantizing noise

theorems for conditions of whiteness, uncorrelatedness, zero mean, and variance of (q^2)/12. Coefficient quantization in digital filters. Recommended: 264, 278.

3 units, Aut (Widrow, B)

EE 376A. Information Theory

Extreme points of communication theory: data compression to the entropy limit, and communication at the channel capacity limit. Shannon entropy. Rate distortion theory. Huffman coding. Kolmogorov complexity. Unified treatment based on the asymptotic equipartition theorem. Prerequisite: 178 or 278 or STATS 116, or equivalent.

3 units, Win (Cover, T)

EE 376B. Information Theory

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: 376A.

3 units, Spr (Cover, T)

EE 378. 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. Prerequisite: 278.

3 units, Spr (Staff)

EE 379A. Digital Communication I

Maximum-likelihood data detection, modulation methods and bandwidth requirements, bandpass systems and analysis, intersymbol interference and equalization methods, diversity, phase-locking, and synchronization. Prerequisites: 102B, 278.

3 units, Win (Kahn, J)

EE 379C. Advanced Digital Communication

Multi-dimensional modulation and basis functions, transmit optimization for channels with intersymbol interference, discrete multitone (DMT), orthogonal frequency division multiplexing (OFDM), vector modulation, generalized decision-feedback equalization (GDFE). Prerequisite: 379A.

3 units, not given this year

EE 380. Seminar on Computer Systems

Current research in the design, implementation, analysis, and use of computer systems from integrated circuits to operating systems and programming languages.

1 unit, Aut (Allison, D; Freeman, J), Win (Allison, D; Freeman, J), Spr (Allison, D; Freeman, J), Sum (Allison, D)

EE 382A. Advanced Processor Architecture

Topics include advanced instruction-set design and pipelining, wide instruction fetch, branch prediction, out-of-order and speculative execution, memory disambiguation, vector processors, simultaneous multithreading, multi-core systems, memory hierarchies, and low-level compiler optimizations for processor efficiency. Trade-offs among performance, power, and complexity, and techniques for addressing them. Design or research project in processor architecture. Prerequisites: 108B, 282.

3 units, Spr (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, not given this year

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, Win (Flynn, M)

EE 384A. Internet Routing Protocols and Standards

Local area networks: MAC addressing; IEEE 802.1 bridging protocols (transparent bridging, virtual LANs). Internet routing protocols: Internet protocol (IPv4, IPv6, ICMP); interior gateways (RIP, OSPF) and exterior gateways (BGP, policy routing); IP multicast (IGMP, DVMRP, CBT, MOSPF, PIM); multiprotocol label switching (MPLS). Prerequisite: 284 or CS 244A.

3 units, not given this year

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 244A. Recommended: 384A.

3 units, Spr (Tobagi, F)

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, not given this year

EE 384M. Network Algorithms

Theory and practice of designing and analyzing algorithms arising in networks. Topics include: designing algorithms for load balancing, switching, congestion control, network measurement, the web infrastructure, and wireless networks; and analyzing the performance of algorithms via stochastic network theory. Algorithm design using randomization, probabilistic sampling, and other approximation methods. Analysis methods include the use of large deviation theory, fluid models, and stochastic comparison. Research project. Prerequisite: 278 or CS 365.

3 units, Spr (Prabhakar, B)

EE 384S. Network Architectures and Performance Engineering

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

First of two-course sequence. Theory and practice of designing packet switches and routers. Evolution of switches and routers. Output scheduling: fairness, delay guarantees, algorithms. Unicast switching: blocking phenomena and their alleviation, connection between switch scheduling and bipartite graph matching. Multicast switching. Theoretical complements: simple queueing models, Bernoulli and Poisson processes, graph matching algorithms, urn

problems, stability analysis using Lyapunov functions, fluid models. Prerequisites: 284 or CS 244A, 178 or 278 or STAT 116.

3 units, not given this year

EE 384Y. Packet Switch Architectures II

Second of two-course sequence. Theory and practice of designing packet switches and routers. Address lookup: exact matches, longest prefix matches, performance metrics, hardware and software solutions. Packet classifiers: for firewalls, QoS, and policy-based routing; graphical description and examples of 2-D classification, examples of classifiers, theoretical and practical considerations.

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 (McCluskev, E; Mitra, S), Win (McCluskev, 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, Fire codes, BCH codes, Reed-Solomon codes. Decoding algorithms for BCH and Reed-Solomon codes. Prerequisites: elementary probability, linear algebra.

3 units, Aut (Gill III, 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, Spr (Montanari, A)

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 (Palanker, D), Win (Staff), Spr (Staff), Sum (Staff)

EE 392B. Introduction to Imaging Sensors

Design and analysis: silicon photodetectors; CCD and CMOS passive and active sensor operation; noise and FPN analysis; spatial resolution and MTF; SNR and dynamic range; high dynamic range architectures; A/D conversion approaches. Analysis of the signal path in a digital camera starting from the optics, through the sensor, the A/D converter, to the different color processing steps. MATLAB camera simulator is used to explore various tradeoffs in camera design. Prerequisites: undergraduate level device, circuit, and system background equivalent to 102A, 101A,B; and familiarity with noise analysis.

3 units, not given this year

EE 392F. Logic Synthesis of VLSI Circuits

Similar to former 318. Solving logic design problems with CAD tools for VLSI circuits. Exact and heuristic algorithms for logic synthesis. Representation and optimization of combinational logic functions (encoding problems, binary decision diagrams) and of multiple-level networks (algebraic and Boolean methods, don't-care set computation, timing verification, and optimization);and modeling and optimization of sequential functions and networks (retiming), semicustom libraries, and library binding. Prerequisites: familiarity with logic design, algorithm development, and programming.

3 units, Win (Vishnu, M)

EE 392G. Terahertz Technologies and Applications

Principles of THz wave generation, detection, and applications. Sources and systems that provide access to the THz region of the spectrum include ultrafast time-domain systems, direct generation using terahertz lasers as well as nonlinear optical frequency conversion. Terahertz measurement techniques include detector technologies, terahertz waveguides, terahertz measurements using surface plasmons, near-field effects, and nonlinear optical methods of detection. Applications of terahertz radiation including spectroscopy, sensing, and imaging, holography, terahertz communications concepts and systems, photonic crystals, and metamaterials.

3 units, Aut (Vodopyanov, K)

EE 392H. Coding for Wireless Channels

Theoretical foundations of modern coding theory, with applications to wireless transmission systems. State-of-the-art coding theory using soft (maximum-likelihood) decoding. Topics include: fading channel models (independent fading, block fading, MIMO); information-theoretic performance limits; coding on signal spaces; optimization criteria for code design; factor-graphical models of codes including block, convolutional, turbo, LDPC, and concatenated codes; trellis-coded modulation and bit-interleaved modulation; iterative (turbo) receivers for coded signals: memoryless, intersymbol-interference, MIMO, and multiuser channels; and EXIT-chart analyses of performance. Prerequisites: EE 278, 279. Recommended: EE 376A.

3 units, Aut (Staff)

EE 392R. Charged Particle Optics

Electron optics of charged particle instruments including transmission electron microscope, scanning electron microscope and related tools, mass and energy spectrometers, electron beam lithography tools, focused ion beam systems, electron diffraction, proximal probe tools such as the scanning tunneling microscope. Topics include sources, first-order focusing of electrons and ions, third-order aberrations, space-charge effects and diffraction. Goal is to compute the optical parameters of axially-symmetric magnetic and electric lenses and to be familiar with the principles of operation of the above charged-particle systems and the factors limiting their performance. Prerequisites: undergraduate geometrical optics and vector calculus or 217.

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, Aut (Stinson, J)

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 (Wong, S), Win (Wong, S), Spr (Wong, S)

EE 398A. Image Communication I

First of two-course series. Principles and systems for digital image communication, emphasizing source coding for efficient storage and transmission of still and moving images. Fundamentals and still image communication techniques. Lossless coding principles. Arithmetic coding, run-length coding. Facsimile coding. Lossy compression principles, scalar quantization, vector quantization. Lossless and lossy predictive coding. Transform coding. Multiresolution coding, subband coding, and wavelets. EZW and SPIHT coding. Embedded image representations. Standards: ITU-T T.4, T.6, JBIG, JPEG, JPEG-2000. Students investigate image compression algorithms in Matlab. Prerequisites: 261, 278.

3 units, not given this year

EE 398B. Image Communication II

Second of two-course series. Digital video communication techniques. Interframe coding. Conditional replenishment. Motion-compensated prediction. Motion-compensated hybrid coding. Motion estimation. Rate distortion analysis and optimization of video coding schemes. Advanced motion compensation techiques. Scalable layered video representations. Error-resilient video coding. Applications: videotelephony, videoconferencing, digital TV

broadcasting, Internet video streaming, wireless video. Standards: MPEG-1, MPEG-2, MPEG-4, ITU-T, H.261, H.263, H264. Students investigate video compression algorithms in Matlab or C. Term project. Prerequisite: 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 2007-08 is innovation systems and processes in Asia. Government funding, university/industry relations, and technology transfer in Asia, with the U.S. as point of comparison. How companies and entrepreneurs convert invention into profit. Guest speakers from industry and government.

1 unit, Aut (Dasher, R)

EE 402S. Topics in International Advanced Technology Research
Theme for 2006-07 is advanced technologies for biomedical applications. Photonic and electronic systems and components for imaging, micro-arrays, drug delivery, artificial organs, and robot-assisted surgery. Guest speakers from industry, government, and universities. May be repeated for credit. Recommended: basic electronics.

1 unit, Spr (Dasher, R)

EE 402T. Entrepreneurship in Asian High Tech Industries
Patterns and challenges of entrepreneurship in Asia. Business and technology issues in start-up companies in Asian economies. Guest speakers from industry, government, and universities. May be repeated for credit.

1 unit, Spr (Dasher, R)

EE 410. Integrated Circuit Fabrication Laboratory
Fabrication, simulation, and testing of a highly simplified 1.5 micron CMOS process developed for this course. Practical aspects of IC fabrication including silicon wafer cleaning, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, physical sputtering, and wafer testing. Students perform simulations of the CMOS process using process simulator TSUPREM4 of the structures and electrical parameters that should result from the process flow in the lab. Taught in the Stanford Nanofabrication Facility (SNF) in the Center for Integrated Systems (CIS). 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 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: 314, 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 techiques and technology, processing electronics, information decoding and estimators, and statistical data analysis. Prerequisites: 214, 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, Aut (Spasojevic, M)

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 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, not given this year

EE 478. Topics in Multiple User Information Theory
Topics in multiple user source and channel coding; multiple access channel, correlated source coding, broadcast channel, interference channel, relay channel, and channels with feedback; asymptotic capacity of networks; source coding with side information, multiple descriptions, channels with state, MIMO channels. Prerequisite: 376A.

3 units, not given this year

EE 479. Multiuser Digital Transmission Systems
Multiuser communications design, modulation, and reception. Capacity regions and fundamentally optimum designs for multiple access, broadcast, and interference channels. Iterative waterfilling, optimum spectrum balancing, band preference methods, vectoring, and multi-user generalized decision feedback equalization (GDFE) as used for vector broadcast and multiple access. Prerequisite: 379C.

3 units, Aut (Cioffi, J)

EE 492M. Space-Time Wireless Communications
For EE graduate students and wireless design engineers. Space-time wireless (smart antenna) communications and improvements in capacity, coverage, and quality of wireless networks. Multiple input multiple output (MIMO), and its use in WiFi and WIMAX systems and in next generation mobile systems such as 3GPPLTE. Prerequisites: 276, 278, 279. Recommended: 359.

3 units, not given this year

OVERSEAS STUDIES COURSES IN ELECTRICAL ENGINEERING

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN ELECTRICAL ENGINEERING COURSES

OSPBER 40B. Introductory Electronics

5 units, Aut (Howe, R), Win (Howe, R), Spr (Wong, S)

OSPBER 50B. Introductory Science of Materials

4 units, Aut (Staff), Win (Staff), Spr (Staff)

FLORENCE ELECTRICAL ENGINEERING COURSES

OSPFLOR 50F. Introductory Science of Materials

4 units, Aut (Staff), Win (Staff), Spr (Staff)

KYOTO ELECTRICAL ENGINEERING COURSES

OSPKYOTO 40K. Introductory Electronics

5 units, Spr (Wong, S)

PARIS ELECTRICAL ENGINEERING COURSES

OSPPARIS 40P. Introductory Electronics

5 units, Aut (Howe, R), Spr (Wong, S)

OSPPARIS 50P. Introductory Science of Materials

4 units, Aut (Staff), Win (Staff), Spr (Staff)

ENERGY RESOURCES ENGINEERING (ENERGY) COURSES

For information on undergraduate and graduate programs in the Department of Energy Resources Engineering, see the "Energy Resources Engineering" section of this bulletin.

UNDERGRADUATE COURSES IN ENERGY RESOURCES ENGINEERING

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 (Orr, F)

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; Lambers, J)

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 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 units, Aut (Benson, S; Wilcox, J)

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 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics
(Same as EESS 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 (Boucher, A)

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, Spr (Horne, R)

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 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 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, Aut (Lambers, J)

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)

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, Win (Orr, F)

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, Spr (Castanier, L)

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)

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, Win (Journel, A)

ENERGY 241. Practice of Geostatistics and Seismic Data Integration
(Same as GEOPHYS 241A.) Students build a synthetic 3D fluvial channel reservoir model with layer depths, channel geometry, and facies-specific petrophysic and seismic properties, stressing the physical significance of geophysical data. Reference data set is sparsely sampled, providing the sample data typically available for an actual reservoir assessment. Geostatistical reservoir modeling uses well and seismic data, with results checked against the reference database. Software provided (GSLIB and SRBtools). Prerequisite: ENERGY 240. Recommended: experience with Unix, MATLAB/C++/Fortran programming.

3-4 units, Spr (Mukerji, T; Caers, J)

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.) 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)

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)

ENERGY 253. Carbon Capture and Sequestration
(Same as ENERGY 153.) CO_2 separation from syngas and flue gas for gasification and combustion processes. Transportation of CO_2 in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO_2. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis.

3 units, Aut (Benson, S; Wilcox, J)

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 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, Spr (Horne, R)

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 (Mukerji, T)

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), Win (Staff), Spr (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), Spr (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), Spr (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), Spr (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), Spr (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), Spr (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), Spr (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 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

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 (Horne, R), Win (Horne, R), Spr (Horne, R)

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 Petroleum 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 Petroleum 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 Petroleum Engineering
Experimental, computational, or theoretical research. Advanced technical report writing. Limited to 6 units total.

1-6 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ENERGY 362. Engineer's Degree Research in Petroleum 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 Petroleum 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 Petroleum 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)

ENGINEERING (ENGR) COURSES

The following Engineering courses deal with subject areas within engineering that are, in their essential nature, broader than the confines of any particular branch of engineering. These courses are taught by professors from several departments of the School of Engineering. Of the courses described in this section, many are of general interest to both engineering and non-engineering students. In addition, certain departmental courses are of general interest and without prerequisites. Students interested in the interactions between technology and society should also see the "Science, Technology, and Society" section of this bulletin. For information on undergraduate programs in the School of Engineering, see the "School of Engineering" section of this bulletin. For information on graduate programs in the School of Engineering, see the relevant department section of this bulletin. For information on undergraduate programs in the School of Engineering, see the "School of Engineering" section of this bulletin. For information on graduate programs in the School of Engineering, see the relevant department section of this bulletin.

UNDERGRADUATE COURSES IN ENGINEERING

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, Sum (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 (Mitiguy, P)

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, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. GER:DB-EngrAppSci

3 units, Spr (Hwang, L)

ENGR 25. Biotechnology
(Same as CHEMENG 25.) Interplay among biology, technology, and society. Topics include biological fundamentals, genetic engineering, protein production, pharmaceuticals, antibodies, plant biotechnology, vaccines, transgenic animals, and stem cells. The role of intellectual property, business, government regulations, and ethics in biotechnology. GER:DB-EngrAppSci

3 units, Spr (Wang, C)

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
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. Enrollment limited to 200. Lab. Prerequisite: PHYSICS 43. GER:DB-EngrAppSci
5 units, Aut (Lee, T), Spr (Wong, S)

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, Win (Melosh, N), Spr (Sinclair, R)

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. 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 (Goel, A), Spr (Van Roy, B)

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 programming experience required. GER:DB-EngrAppSci
3-5 units. Aut (Sahami, M), Win (Roberts, E), Spr (Young, P), 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, Win (Cain, G), Spr (Roberts, E), 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 (Hurlbutt, T), Spr (Cain, G)

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. (Lougee, Staff)
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. Prerequisite: 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, or consent of instructor.
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. The medical, social, psychological, and technical challenges in designing assistive technologies to improve the lives of people with disabilities. Guest speakers include professionals, clinicians, and device users. Additional unit for students who prepare a project background and preliminary design report for an assistive technology project to be undertaken in ME 113 or as independent study in Spring Quarter.
1-2 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 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)

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), alternate years, not given next year

ENGR 140A. Management 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. Management 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.

2 units, Aut (Byers, T)

ENGR 140C. Management 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 units, Aut (Byers, T)

ENGR 145. Technology Entrepreneurship
For juniors, seniors, and coterminal students of all majors who seek to understand the formation and growth of a technology-based enterprise. The entrepreneurial process, and the role of the individual. Case studies; projects. GER:DB-SocSci

4 units, Aut (Kosnik, T; Blank, S), Win (Kosnik, T; Blank, S)

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, Win, 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
(S,Sem Same as MATSCI 159Q.) Stanford Introductory Seminar. 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
Structured writing instruction for students working on non-course related materials including theses, dissertations, and journal articles. Weekly individual conferences.

1-5 units, Aut, Win, Spr (Reichard, C)

ENGR 202W. Technical Writing
How to self-edit for clarity, cohesion, focus, and conciseness. Emphasis is on improving the readability of technical and scientific material.

3 units, Aut (Reichard, C), Win (Reichard, C), Spr (Reichard, C)

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: 207A or 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. The medical, social, psychological, and technical challenges in designing assistive technologies to improve the lives of people with disabilities. Guest speakers include professionals, clinicians, and device users. Additional unit for students who prepare a project background and preliminary design report for an assistive technology project to be undertaken in ME 113 or as independent study in Spring Quarter.

1-2 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 231. Transformative Design
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.

3-5 units, Win (Jain, S; Roth, B; Moggridge, W; Ju, W)

ENGR 240. Introduction to Micro and Nano Electromechanical Systems (M/NEMS)
For first-year graduate students and seniors. The role of miniaturization technologies in materials, mechanical, biomedical engineering, and information technology. M/NEMS facbrication techniques, device applications, and the design tradeoffs in developing systems.

3 units, Aut (Pruitt, B)

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, Win, 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 widepread application.

2-4 units, Spr (Boyle, B; Crandall, R; Brown, S; Thompson, S)

ENGR 281. Design and Media
Students team with WNYC, the BBC, PRI, WGBH, and the New York Times to launch a new national radio show. User participation in media and application of the design thinking process to new media applications. Experimental design projects, prototyped on the air. How to engage a million listeners and help them make an impact on their world? Prerequisite: application.

3 units, Spr (Doorley, S)

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 (Cantwell, B), Win (Eaton, J), Spr (Iaccarino, G)

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.
5 units, Win (Leifer, L; Cutkosky, M)

ENGR 311A. Women's Perspective: Choose Your Own Adventure
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, Aut (Sheppard, S)

ENGR 311B. Designing the Engineer
Continuation of ENGR 311A. Recommended: ENGR 311A.
1 unit, Spr (Sheppard, S; Roth, B)

ENGR 312. Science and Engineering Course Design
(Same as CTL 312, GES 201.) 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 341. Micro/Nano Systems Design and Fabrication Laboratory
Theory and fundamentals. Hands-on training in the Stanford Nanofabrication Facility. Prerequisite: ENGR 240 or equivalent.
3-5 units, Spr (Solgaard, O)

ENGR 342. MEMS Laboratory II
Emphasis is on tools and methodologies for designing and fabricating N/MEMS-based solutions. Student interdisciplinary teams collaborate to invent, develop, and integrate N/MEMS solutions. Design alternatives fabricated and tested with emphasis on manufacturability, assembly, test, and design. Limited enrollment. Prerequisite: ENGR 341.
3-4 units, Aut (Staff)

OVERSEAS STUDIES COURSES IN ENGINEERING

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN ENGINEERING COURSES

OSPBER 40B. Introductory Electronics
5 units, Aut (Howe, R), Win (Howe, R), Spr (Wong, S)

OSPBER 50B. Introductory Science of Materials
4 units, Aut (Staff), Win (Staff), Spr (Staff)

FLORENCE ENGINEERING COURSES

OSPFLOR 50F. Introductory Science of Materials
4 units, Aut (Staff), Win (Staff), Spr (Staff)

KYOTO ENGINEERING COURSES

OSPKYOTO 40K. Introductory Electronics
5 units, Spr (Wong, S)

PARIS ENGINEERING COURSES

OSPPARIS 40P. Introductory Electronics
5 units, Aut (Howe, R), Spr (Wong, S)

OSPPARIS 50P. Introductory Science of Materials
4 units, Aut (Staff), Win (Staff), Spr (Staff)

ENGLISH (ENGLISH) COURSES

For information on undergraduate and graduate programs in the Department of English, see the "English" section of this bulletin. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature.

ENGLISH COURSE CATALOG NUMBERING SYSTEM

Pre-1750:
100-110 Lecture Courses
111-119 Seminar Courses
1750-1900:
120-129 Lecture Courses
130-139 Seminar Courses
Post-1900:
140-149 Lecture Courses
150-159 Seminar Courses
Required Courses:
160-169
Themes and Topics:
170-179 Lecture Courses
180-189 Seminar Courses
Courses for Advanced Undergraduates and Graduate Students:
200-289
Graduate Colloquia:
300-313
Graduate Seminars:
314-389
Writing Courses, Workshops, Individual Study:
90-99, 190-199, 290-299, 390-399

UNDERGRADUATE COURSES IN ENGLISH

ENGLISH 9. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and their Contemporaries
(Same as ENGLISH 109. English majors and others taking 5 units,

register for 109.) Introduction to English literary history from the late 14th through the mid 17th centuries. Emphasis is on interpretation of major works by Chaucer, Marlowe, Shakespeare, Jonson, Donne, Herbert, Marvell, and Milton. GER:DB-Hum

3-5 units, Win (Riggs, D)

ENGLISH 14Q. Tis All in Pieces: John Donne and the Early Modern World

Stanford Introductory Seminar. Preference to sophomores. Situating Donne's work within his historical and cultural milieu; how his writing reflects changes on the threshold of the modern era. The historical, scientific, and cultural milieu of the early modern world. Related developments in mathematical perspective and early modern art. The influence of his dramatic realism on modern poets such as Browning, Eliot, and Rich, and composers such as Benjamin Britten and Bob Dylan. GER:DB-Hum

4-5 units, Win (Brooks, H)

ENGLISH 20. Masterpieces of English Literature II: From the Enlightenment to the Modern Period

(Same as ENGLISH 120. English majors and others taking 5 units, register for 120.) From the 18th to the 20th centuries. Topics include the rise of the novel, lyric and dramatic poetry, Romanticism, realism, Modernism, characterization, narrative voice, and the influence of history on literature. GER:DB-Hum

3-5 units, Spr (Jarvis, C)

ENGLISH 21. Masterpieces of American Literature

(Same as ENGLISH 121. English majors and others taking 5 units, register for 121.) How race and ethnicity have been pivotal in the construction, proliferation, and development of American Literature. Authors: Mary Rowlandson, Frederick Douglass, William Wells Brown, Mark Twain, Nella Larsen, Fae Myenne Ng, Helena Maria Viramontes, N. Scott Momaday, and John Okada. GER:DB-Hum

3-5 units, Aut (Sohn, S)

ENGLISH 22. Jane Austen into Film

(Same as ENGLISH 122. English majors and others taking 5 units, register for 122.) Jane Austen's six novels and their transformation into films from the 40s to the present. Historical motives and psychological imperatives for recreating Austen's work in cinematic form, emphasizing narrative techniques distinctive to prose and camera. Fundamentals of narrative theory and cinematic analysis. GER:DB-Hum

3-5 units, Spr (Shloss, C)

ENGLISH 42B. The Films of Woody Allen

(Same as ENGLISH 142B. English majors and others taking 5 units, register for English 142B.) Allen as one of the most influential, prolific, and controversial filmmakers. His comic vision, attitudes towards sex and gender relations, and cultural importance. The development of his career and work. GER:DB-Hum

3-5 units, Aut (Polhemus, R)

ENGLISH 42E. The Films of the Coen Brothers

(Same as ENGLISH 142E. English majors and others taking 5 units, register for 142E). Visual or filmic aspects of narration and the place of major Coen films in the company of precedent films such as Preston Sturges's *Sullivan's Travels* and Robert Altman's *The Long Goodbye*. Films include *Blood Simple, Raising Arizona, Miller's Crossing, Fargo, The Big Lebowski, O Brother, Where Art Thou?,* and *No Country for Old Men*. Readings include *The Big Lebowski* by J.M. Tyree and Ben Walters. GER:DB-Hum

3-5 units, Aut (Fields, K)

ENGLISH 43A. American Indian Mythology, Legend, and Lore

(Same as ENGLISH 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, Win (Fields, K)

ENGLISH 47. Masterpieces of Contemporary Literature

(Same as ENGLISH 147.) How contemporary writers are influenced by their forebears, even as they reinvent or rewrite the inherited tradition, by interrogating the meanings of the concept of the contemporary by grouping old and new texts. Groupings include Charlotte Bronte's *Jane Eyre* (1847) and Jean Rhys's *Wide Sargasso Sea* (1966); Mary Shelley's *Frankenstein* and Margaret Atwood's *The Handmaid's Tale*; Virginia Woolf's *Mrs. Dalloway*, Michael Cunningham's *The Hours*, and Ian McEwan's *Saturday*. Sources include film adaptations. GER:DB-Hum

3-5 units, Win (Staveley, A)

ENGLISH 51N. Drama Queens: Powerful Women on Stage

Stanford Introductory Seminar. Preference to freshmen. Eight strong women at the center of works of Greek, Shakespearean, and modern theater in the context of social misogyny. How they enact the social and spiritual visions of their creators. Sources include film performances. Students perform simple scene work. No acting experience required. GER:DB-Hum

3 units, Aut (Friedlander, L)

ENGLISH 52N. Ten Top Books

Stanford Introductory Seminar. Preference to freshmen. The books most frequently taught in U.S. English departments including classics by Nathaniel Hawthorne and F. Scott Fitzgerald and recent works by minority writers such as Toni Morrison and Maxine Hong Kingston. Cultural and historical contexts, and the aesthetic and social factors that canonize these literary supertexts. GER:DB-Hum

3 units, Win (Jones, G)

ENGLISH 53N. Aesthetic Taste and Gastronomy

Stanford Introductory Seminar. Preference to freshmen. A sampling of aesthetics and gastronomy as defined by 18th-century British essayists and their heirs from England and France. Focus is on the development of middle class taste, figurative as well as food-oriented, and manners, snobbery, and sensibility. GER:DB-Hum

3 units, Win (Gigante, D)

ENGLISH 60. Poetry and Poetics

(Same as ENGLISH 160. English majors and others taking 5 units, register for 160.) 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

3-5 units, Aut (Greene, R), Win (Jenkins, N), Spr (Boland, E)

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 69Q. Sources of Global Challenges Today, Possibilities for Global Solutions: A Literary Exploration

Stanford Introductory Seminar. Preference to sophomores. Concerns central to literary study, comparative study in race and ethnicity, and African and African American Studies as expressed in fiction from Africa, the Caribbean, the U.S., and Hawai'i. Issues include: relations between the West and the Muslim world; class and race in the U.S.; the shift of world populations from rural society to the metropolis; international immigration and refugee situations; and how women's lives are impacted by society, and how they shape and change it. Opportunities for dialogue with members of local ethnic and religious communities. GER:DB-Hum

3-5 units, Spr (Drake, S)

ENGLISH 70N. Shakespeare on Film

Stanford Introductory Seminar. Preference to freshmen. Premises of film criticism. Films include *A Midsummer Night's Dream* directed by Max Reinhardt and Peter Hall; *Romeo and Juliet* by Franco Zefirelli and Baz Luhrman; *Henry V* by Laurence Olivier and Kenneth Branagh; and *Hamlet* by Sven Gade, Olivier, Grigori Kozintsev, Zefirelli, Branagh, and Michael Almereyda. GER:DB-Hum

3 units, Aut (Riggs, D)

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, Aut (Evans, M)

ENGLISH 81. Philosophy and Literature

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 units, Win (Anderson, L; Vermeule, B)

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, Spr (Rebholz, R)

ENGLISH 85Q. The Brontës: A Victorian Family

Stanford Introductory Seminar. Preference to sophomores. The Brontë children's stories of personal power and political intrigue, based on the the news of the period. Readings include Charlotte Brontë's *Jane Eyre*, Emily Brontë's *Wuthering Heights*, and Anne Brontë's *Agnes Grey* focusing on the tedium, aspirations, and frustrations of these gifted women. Historical, cultural, and autobiographical questions in these novels, the juvenilia, and a representative later work. Prerequisite: PWR 1. GER:DB-Hum

3-4 units, Win (Paulson, L)

ENGLISH 87N. The Graphic Novel: Word, Image, Sound, Silence

Stanford Introductory Seminar. Preference to sophomores. The evolution of funnies to comics and graphic novels. How definitions and representations of this genre have changed over the last century. The controversy over the status of the graphic novel. GER:DB-Hum

5 units, Win (Lunsford, A)

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.

5 units, Aut (Antopol-Johnson, M; Horack, S; Kealey, T; Tanaka, S; Tyree, J), Win (Antopol-Johnson, M; Pneuman, A; Tyree, J), Spr (Antopol-Johnson, M; Hutchins, S; Reese, R; Tanaka, S; Tyree, J)

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 (Tyree, J; Johnson, A), Spr (Hummel, 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 (McGriff, M; Ekiss, K), Win (McGriff, M), Spr (McGriff, M; Ekiss, K)

ENGLISH 94. Introduction to Creative Writing: Form and Structure

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 (Hummel, M), Spr (Snider, B)

ENGLISH 99T. Technology for Artists and Writers

Practicum. How creative writing and other artistic pursuits have moved from the actual world of print, art galleries, and concert halls to the virtual world. How artists and writers are using online facilities such as Second Life, YouTube, and blogs as platforms to create storytelling and art. Students create a web portfolio, using Adobe Creative Suite including Photoshop, Illustrator, and Dreamweaver, that showcases their talents and interests using photography, film, music, creative writing, dance, visual arts, and theater.

3 units, Win (Kealey, T; Sabol, J)

ENGLISH 102. Chaucer

Chaucer's verbal art in the context of medieval literary traditions, focusing *on The Canterbury Tales*. GER:DB-Hum

5 units, Aut (Lerer, S)

ENGLISH 105. The Renaissance

English literature from Sir Thomas More's *Utopia* to Milton's *Paradise Lost*. The good state, the good man, and the good poem. Major literary genres of the period: lyric, romance, comedy, tragedy, and epic. GER:DB-Hum

5 units, Spr (Summit, J)

ENGLISH 109. Masterpieces of English Literature I: Chaucer, Shakespeare, Milton, and their Contemporaries

(Same as ENGLISH 9. English majors and others taking 5 units, register for 109.) Introduction to English literary history from the late 14th through the mid 17th centuries. Emphasis is on interpretation of major works by Chaucer, Marlowe, Shakespeare, Jonson, Donne, Herbert, Marvell, and Milton. GER:DB-Hum

3-5 units, Win (Riggs, D)

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 112A. Wicked Witches of the West: Dangerous Women in Greek and Shakespearean Tragedy

Workshop. Women who fascinate, control, and frighten men in classical and Elizabethan drama. The presentation of women in three pairs of Greek and Elizabethan plays and in two 20th-century works. Theatrical styles of each period through doing scenes, watching films, and the history of theater. No background in performing required. GER:DB-Hum, EC-Gender

5 units, Win (Friedlander, L)

ENGLISH 113. Sex and Violence in Elizabethan and Jacobean Drama

Nine tragedies by Christopher Marlowe, Thomas Kyd, Elizabeth Cary, Thomas Middleton, John Webster and John Ford; their literary and cultural settings. Why Elizabethan and Jacobean playwrights depicted extreme forms of sociopathic behavior such as murder, rape, infanticide, incest, and necrophilia. The connections between sex and violence in these plays. Why are they still read and performed? What can be learned from them? GER:DB-Hum, EC-Gender

5 units, Win (Riggs, D)

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 120. Masterpieces of English Literature II: From the Enlightenment to the Modern Period

(Same as ENGLISH 20. English majors and others taking 5 units, register for 120.) From the 18th to the 20th centuries. Topics include the rise of the novel, lyric and dramatic poetry, Romanticism, realism, Modernism, characterization, narrative voice, and the influence of history on literature. GER:DB-Hum

3-5 units, Spr (Jarvis, C)

ENGLISH 121. Masterpieces of American Literature

(Same as ENGLISH 21. English majors and others taking 5 units, register for 121.) How race and ethnicity have been pivotal in the construction, proliferation, and development of American Literature. Authors: Mary Rowlandson, Frederick Douglass, William Wells Brown, Mark Twain, Nella Larsen, Fae Myenne Ng, Helena Maria Viramontes, N. Scott Momaday, and John Okada. GER:DB-Hum

3-5 units, Aut (Sohn, S)

ENGLISH 122. Jane Austen into Film

(Same as ENGLISH 22. English majors and others taking 5 units, register for 122.) Jane Austen's six novels and their transformation into films from the 40s to the present. Historical motives and psychological imperatives for recreating Austen's work in cinematic

form, emphasizing narrative techniques distinctive to prose and camera. Fundamentals of narrative theory and cinematic analysis. GER:DB-Hum

3-5 units, Spr (Shloss, C)

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, Win (Jones, G)

ENGLISH 125A. The Gothic Novel
(Same as COMPLIT 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, Win (Bender, J)

ENGLISH 135. Victorian Poetry
The thematic, formal, and aesthetic innovations of Victorian poetry which is often imagined as a dead space between the romantic and modernist movements. Readings include R. Browning's dramatic monologues, Tennyson's *Idylls*, Swinburne's *English Sapphics*, and Michael Field's collectively written lyrics. Narrative Victorian poetry, including Meredith's *Modern Love* and Barrett Browning's *Aurora Leigh*, and its relation to the 19th century's ascendant form, the novel. GER:DB-Hum

5 units, Win (Jarvis, C)

ENGLISH 135H. Thomas Hardy
The autobiography, novels, and poems of Thomas Hardy. Emphasis is on his combination of a self-consciously modern cast of thought with an apparently paradoxical preoccupation with the personal, local, and national past, as described by Michael Millgate in his seminal biography of the author.

5 units, Spr (Jarvis, C)

ENGLISH 136. Romantic Poetry and Poetics
Major Romantic writers including William Blake, William Wordsworth, Samuel Taylor Coleridge, Percy Bysshe Shelley, and John Keats. Focus on form in the lyrical ballad, ode, epic romance, and closet drama. GER:DB-Hum

5 units, Aut (Gigante, D)

ENGLISH 136A. The Lyric in 19th-Century Britain
Development of the lyric through the 19th century. Social, political, and economic pressures on lyric. How poetry expresses relations in society. Poems by Wordsworth, Keats, Shelley, Tennyson, Browning, D.G. Rossetti, C. Rossetti, Arnold, and Hopkins. GER:DB-Hum

5 units, Spr (Rovee, C)

ENGLISH 137A. Oscar Wilde
Major works of this Magdalen College alumnus. Genres include: poems, plays, social criticism, art theory, novels, short stories. Wilde's intellectual significance in his time and for the modern age that he helped to usher into existence. The struggle for art's significance in an increasingly cutthroat world; the changing face of Oxford in an era of democratization; the costs of being different in a straitlaced Victorian society. GER:DB-Hum

5 units, Aut (Rovee, C)

ENGLISH 138T. Mark Twain and The Assault of Laughter
How a *phunny phellow*, notorious liar, and irreverent blasphemer became a moral barometer of American literature; how his fictions, satires, and burlesques provided a comic barrage against the pretensions of his day. Major works such as *Huckleberry Finn* and *Pudd'nhead Wilson*, and less known works such as *No. 44*, *The Mysterious Stranger*. Twain's literary and comic techniques, and how his complex and mythic fictions erupt along America's fault lines of race, gender, and class.

5 units, Aut (Obenzinger, H)

ENGLISH 139A. Henry James
Readings include *The Portrait of a Lady* and shorter fiction such as *Daisy Miller* and *The Turn of the Screw*. GER:DB-Hum

5 units, Aut (Dekker, G)

ENGLISH 140A. Creative Resistance and the Holocaust
Literature, music, art, and photography that emerged from the European Jewish catastrophe. Sources include Elie Wiesel, Primo Levi, Dan Pagis, Paul Celan, Charlotte Salomon, Bernard Malamud, Philip Roth, and Cynthia Ozick. Guest lecture by Holocaust survivor. GER:DB-Hum

5 units, Win (Felstiner, J)

ENGLISH 142B. The Films of Woody Allen
(Same as ENGLISH 42B. English majors and others taking 5 units, register for English 142B.) Allen as one of the most influential, prolific, and controversial filmmakers. His comic vision, attitudes towards sex and gender relations, and cultural importance. The development of his career and work. GER:DB-Hum

3-5 units, Aut (Polhemus, R)

ENGLISH 142E. The Films of the Coen Brothers
(Same as ENGLISH 42E. English majors and others taking 5 units, register for 142E). Visual or filmic aspects of narration and the place of major Coen films in the company of precedent films such as Preston Sturges's *Sullivan's Travels* and Robert Altman's *The Long Goodbye*. Films include *Blood Simple*, *Raising Arizona*, *Miller's Crossing*, *Fargo*, *The Big Lebowski*, *O Brother, Where Art Thou?*, and *No Country for Old Men*. Readings include *The Big Lebowski* by J.M. Tyree and Ben Walters. GER:DB-Hum

3-5 units, Aut (Fields, K)

ENGLISH 142G. 20th-Century American Fiction
Major works of fiction by American writers, starting in the 20s with Hemingway and Fitzgerald and continuing with Faulkner, Welty, Ellison, and writers on the contemporary scene such as Morrison and DeLillo. Fiction as a genre, and its evolution in response to forces in modern American life and art. GER:DB-Hum

5 units, Spr (Rampersad, A)

ENGLISH 143A. American Indian Mythology, Legend, and Lore
(Same as ENGLISH 43A.) 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, Win (Fields, K)

ENGLISH 143E. Introduction to African and African American Studies
(Same as AFRICAAM 105, 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, Win (Elam, M; Carson, C)

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.) How contemporary writers are influenced by their forebears, even as they reinvent or rewrite the inherited tradition, by interrogating the meanings of the concept of the contemporary by grouping old and new texts. Groupings include Charlotte Bronte's *Jane Eyre* (1847) and Jean Rhys's *Wide Sargasso Sea* (1966); Mary Shelley's *Frankenstein* and Margaret Atwood's *The Handmaid's Tale*; Virginia Woolf's *Mrs. Dalloway*, Michael Cunningham's *The Hours*, and Ian McEwan's *Saturday*. Sources include film adaptations. GER:DB-Hum

3-5 units, Win (Staveley, A)

ENGLISH 150D. Women Poets
The development of women's poetry from the 17th to the 20th century. How these poets challenge and enhance the canon, amending and expanding ideas of tone, voice and craft, while revising societal expectations of the poet's identity. Poets include Katharine Philips, Letitia Barbauld, Elizabeth Barrett Browning, Charlotte Mew, Sylvia Plath, and Adrienne Rich. GER:DB-Hum

5 units, Spr (Boland, E)

ENGLISH 152D. W.E.B. DuBois as Writer and Philosopher
(Same as AFRICAAM 152, PHIL 194L.) Capstone seminar for Philosophy and Literature programs. Preference to majors in English, Philosophy, African and African American Studies, or the Philosophy and Literature programs. Life, career, thought, and writings of DuBois. Focus on the first half of his career, interactions among his early philosophical perfectionism, his work in social theory/social science, and his literary ambitions as an essayist and novelist. Sources include *Souls of Black Folk,* as well as his books on history and sociology, scholarly essays, and novels. GER:DB-Hum

5 units, Spr (Elam, M; Anderson, L)

ENGLISH 153C. British Literature of the 1910s
The 1910s opened with the birth of modernism in Britain, but ended elegiacally, as the country mourned almost a million dead. The diverse literary output of a decade interrupted by war, including novels by E. M. Forster, Virginia Woolf, and D. H. Lawrence, short stories by Katherine Mansfield and James Joyce, the war poetry of Wilfred Owen and Rupert Brooke, and the avant garde poetic experiments of T. S. Eliot and Ezra Pound. GER:DB-Hum

5 units, Win (Sullivan, H)

ENGLISH 153H. Digital Humanities: Beyond the Book
(Same as HUMNTIES 198J.) How electronic texts, literary databases, computers, and digital corpora offer unique ways of reading, analyzing, and understanding literature. Intellectual and philosophical problems associated with an objective methodology within a traditionally subjective discipline. GER:DB-Hum

5 units, Aut (Jockers, M)

ENGLISH 153J. Virginia Woolf and the Social System
Woolf's major prose narratives in light of the social and historical circumstances which brought them into being and to which they respond. Topics include *The Voyage Out* as the portrait of the artist as a young woman; *Mrs. Dalloway* and the English class system; the domestic politics of *To the Lighthouse*; feminism in historical perspective in *A Room of One's Own*; pacifism and the coming of war in *Between the Acts*; and lesbian consciousness in *Orlando*. GER:DB-Hum

5 units, Spr (Shloss, C)

ENGLISH 160. Poetry and Poetics
(Same as ENGLISH 60. English majors and others taking 5 units, register for 160.) 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

3-5 units, Aut (Greene, R), Win (Jenkins, N), Spr (Boland, E)

ENGLISH 163. Shakespeare
Major plays emphasizing theatrical representation of extreme characters. GER:DB-Hum

5 units, Aut (Riggs, D), Win (Orgel, S), Spr (Hoxby, B)

ENGLISH 171A. English in the World
World literatures in English outside the traditional British and American canons. The emergence of varieties of English worldwide and consequent literary production as a consequence of British colonialism. Major sites of such Anglophone literatures include the former British colonies of sub-Saharan Africa, the Caribbean, and S. Asia; the settler colonies of Australia, New Zealand, and Canada; and Ireland and S. Africa. GER:DB-Hum

5 units, Spr (Majumdar, S)

ENGLISH 172D. Introduction to Comparative Studies in Race and Ethnicity
(Same as CSRE 196C, HISTORY 65, 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, given next year

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, Win (Greene, R)

ENGLISH 175. Poetry and Environmental Awareness
The environmental imprint and impetus in poetry: Native American poetry, the Bible, the Wordsworths, Coleridge, Keats, Clare, Whitman, Dickinson, Hardy, Hopkins, Yeats, Frost, Williams, D. H. Lawrence, Jeffers, Roethke, Lowell, Millay, Swenson, Bishop, Levertov, and later poets through Hughes, Walcott, Snyder. GER:DB-Hum

5 units, Win (Felstiner, J)

ENGLISH 176. Science Fiction: Techno Dreams and Nightmares
Reinventions of human minds and bodies through technology in science fiction texts and films from around the world (U.S., Britain, Germany, Australia, Japan, Argentina), focusing on mechanically produced creatures (robots, computers, cyborgs, Ais) and biologically engineered beings (evolved animals, androids, clones, aliens). Novels, short stories and films by Shelley, Wells, Huxley, Bioy Casares, Schmidt, Dick, Gibson, Atwood, and Oshii; theoretical texts on the reshaping of human identity in the age of technology. GER:DB-Hum

5 units, Aut (Heise, U)

ENGLISH 180. The Bible as Literature
English literature abounds with references to the Bible that register its cultural and religious significance and its power and beauty as literature. Focus is on its literary qualities, with attention to form, style, structure, themes, and the historical circumstances of the text's composition. No prior knowledge of the Bible required. GER:DB-Hum

5 units, Aut (Karnes, M)

ENGLISH 181. The Great Age of the English Essay
Ramblers and idlers, tatlers and hypoochondriacs, spectators and loungers, connoisseurs and talking parrots: the English essay includes many voices and perspectives, addressing major issues including beauty, war, marriage, adultery, friendship, animal cruelty, and the vulnerability of old books. Focus is on questions of character, genre, and literary style. Authors in the periodical essay tradition including Joseph Addison, Richard Steele, and Thomas De Quincey. GER:DB-Hum

5 units, Win (Gigante, D)

ENGLISH 181C. Shakespeare and Dickens
The problems and stakes of reading two central but historically-separated authors through one another. How theatrical are Dickens's novels and how can the theatrical in Dickens be understood as a working-through of Shakespeare? How do the elements of performance manifest themselves in both? What substitutes for the role of narrator in Shakespearean drama? How can these authors be understood as paradigms of national writing which defines normative British culture and as fundamentally eccentric? GER:DB-Hum

5 units, Aut (Orgel, S; Woloch, A)

ENGLISH 182H. Children's Literature
What is children's literature? How does it matter? Focus is on relationships of illustration and text, the wider literary scene and writings for children, and the status of reading by and with children since the early 18th century.

5 units, Win (Heath, S)

ENGLISH 182R. Oxford Aestheticism
Works by Victorians who were influenced by or resident in Oxford during the peak years of the industrial age. Focus is on those who were integral in the development of British aestheticism. Oxford writers include Walter Pater, William Morris, Gerard Manley Hopkins, John Ruskin, Lewis Carroll, Oscar Wilde, and Matthew Arnold. How these authors' ideas developed in an environment

shaped by religious controversy, educational democratization, modernization, and Oxford's own tense position between the bucolic and the urban. GER:DB-Hum

5 units, Win (Rovee, C)

ENGLISH 182S. Looking North: Canadian Literature
Novels, short stories, and drama by some of Canada's leading contemporary writers including Margaret Atwood, Alice Munro, Michael Ondaatje and Michel Tremblay. Issues of gender, race, culture, nationalism, bilingualism, and geography. How these writers map the Canadian experience and address issues relating to the postmodern and the postcolonial. GER:DB-Hum

5 units, Aut (Staveley, A)

ENGLISH 183F. Contemporary Critical Theory
The study and use of critical theory in the humanities from the 20th century onwards; antecedents in the 18th and 19th centuries. The relationship between disciplinary developments in the production of knowledge and the enactment of power in the domains of gender, class, and race. GER:DB-Hum

5 units, Spr (Majumdar, S)

ENGLISH 183H. Critical Methods from New Criticism to New Historicism
The theory behind and examples of the major modes of critical interpretation practiced in the 20th century: close reading, reader response criticism, speech act theory, genre criticism, intertextual reading, and historicist interpretation. Plays by Shakespeare and lyric poems by Donne, Keats, Coleridge, and Shelley. GER:DB-Hum

5 units, Spr (Hoxby, B)

ENGLISH 183R. Roland Barthes
The author of the thesis about the death of the author, treated as an author. Readings span Barthes' career from early pieces on cultural signs and mythologies to later, more personal works on photography and love. Themes include the value of theory, the significance of literature, and the relationship of criticism to life. GER:DB-Hum

5 units, Spr (Rovee, C)

ENGLISH 184. The Novel, The World
(Same as COMPLIT 123.) 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.

5 units, Spr (Moretti, F)

ENGLISH 184C. Texts in History: Medieval to Early Modern
(Same as HUMNTIES 162.) Priority to students in the Humanities honors program. The impact of change from the Middle Ages to the early modern world; how historical pressures challenged conceptions of artistic form, self, divine, and the physical universe. Interdisciplinary methods of interpretation. Texts include: Aristotle, *On the Soul*; Attar,*The Conference of the Birds*; Dante, *Inferno*; Chaucer, *Canterbury Tales*; Christine de Pizan, *The Book of the City of Ladies*; Letters of Columbus; Machiavelli, *The Prince*; Luther, *The Bondage of the Will*; Montaigne, *Essays*; Marlowe, *Doctor Faustus*; poems by John Donne and Lady Mary Wroth; Shakespeare, *Othello*; and works of art. GER:DB-Hum

5 units, Spr (Brooks, H)

ENGLISH 184D. Texts in History: Enlightenment to the Modern
(Same as HUMNTIES 163.) Priority to students in the Humanities honors program and English majors. The relationship between intellectual, political, and cultural history, and imaginative literature in the modern period. Rousseau, Kant, Austen, Mary Wollstonecraft, Marx, Dostoevsky, Nietzsche, Mill, Virginia Woolf, T.S. Eliot, Beckett. GER:DB-Hum

5 units, Aut (Staveley, A)

ENGLISH 184L. Confessions: Writing and Reading the Self
Autobiography and memoir. Sources include personal writers (St. Augustine, J. J. Rousseau, Casanova, Frederick Douglass) and philosophical speculations on the nature of selfhood (René Descartes, Daniel Dennett). Fulfills capstone seminar requirement for the Philosophy and Literature tracks.

5 units, Aut (Lerer, S)

ENGLISH 185. Opera as Cultural History
The history of opera as mirror to the development of modernity in Western culture. Its interdisciplinary and crosscultural nature. Its relationship to issues central to cultural studies such as gender, race, class, and nation. Questions of authorship, the meaning and reliability of musical and literary texts, and performance and production practices. Sources include filmed operas from different periods and language traditions. No knowledge of music or foreign languages required. GER:DB-Hum

5 units, Win (Wyatt, M)

ENGLISH 186A. American Hauntings
Cultural, psychological, social, and political dynamics of haunting in American literature, from the early national period to the late 20th century. Sources include ghost stories and other instances of supernatural, emotional, or mental intervention. Authors include Charles Brockden Brown, Washington Irving, Edgar Allan Poe, Nathaniel Hawthorne, Louisa May Alcott, Charlotte Perkins Gilman, Charles Chesnutt, Henry James, Edith Wharton, Toni Morrison, and Stephen King. GER:DB-Hum

5 units, Spr (Richardson, J)

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 (Hutchins, S; Tanaka, S), Win (Tanaka, S), Spr (Antopol-Johnson, M; MacDonald, D; Tyree, J)

ENGLISH 190F. Fiction Writing for 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, Win (Johnson, A; Kealey, T)

ENGLISH 190R. Form and Theory of the Novel
Seminar for creative writers. How writers connect detail, description, action, dialog, and thought to create scenes; how the balance of these elements creates an author's voice. The novel in terms of tradition, convention, design, and narrative strategy. Guest instructors from Stanford's Jones Lecturers. Prerequisites: manuscript and consent of instructors.

5 units, Spr (Johnson, A)

ENGLISH 190V. Reading for Writers
Taught by the Stein Visiting Fiction Writer. Prerequisite: 90.

5 units, Win (Gordon, M)

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, 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, Win (Ekiss, K), Spr (McGriff, M)

ENGLISH 192T. Special Topics in Intermediate Poetry Writing
Generation and discussion of student poems. How to recognize a poem's internal structure; how to seek models for work. Students submit portfolio for group critique. May be repeated for credit. Prerequisite: ENGLISH 92.

5 units, Aut (Ekiss, K)

ENGLISH 192V. The Occasions of Poetry
Taught by the Mohr Visiting Poet. Prerequisite: 92.

5 units, Win (Doty, M)

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 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 (Woloch, A)

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)

ENGLISH 199. Senior Independent Essay
Open, with department approval, to seniors majoring in English who wish to work throughout the year on a 10,000 word critical or scholarly essay; see note under "Honors Program" above. 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, Win (Greene, R)

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), Spr (Johnson, A)

ENGLISH 292. Advanced Poetry Writing
Focus is on generation and discussion of student poems, and seeking published models for the work.
5 units, Spr (Ekiss, K)

GRADUATE COURSES IN ENGLISH

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ENGLISH 209. Paleography
The study and reading of post-classical, medieval, and early modern manuscripts in Latin, early English, and possibly other vernacular languages, and of the materials and composition of the medieval book.
3-5 units, Spr (Brown, G)

ENGLISH 223E. Whitman and Dickinson
Their poetry and other readings which may include Thoreau's *Walden*, the philosopher Stanley Cavell's book on Walden, and writers in the Whitman-Dickinson traditions such as Hart Crane and Ronald Johnson.
5 units, Win (Fields, K)

ENGLISH 230A. The Novel in Europe: The Age of Compromise, 1800-1848
The novel after the French revolution and the industrial take-off. Novelistic form and historical structures, emphasizing the compromise between old and new ruling class; how maps and statistics can change people's sense of cultural history.
5 units, Win (Moretti, F)

ENGLISH 240. Jacobean Tragedy
Revenge tragedies such as *Hamlet*, domestic tragedies such as *Othello*, and tragedies of suffering such as *King Lear*. Comparison of Shakespeare's plays to those of his greatest contemporaries, collaborators, and successors: Webster, Beaumont and Fletcher, Middleton, and Ford. Opportunities for performance.
5 units, Win (Hoxby, B)

ENGLISH 260B. The Politics of Language
(Same as FEMST 260B.) While the U.S. was founded on principles of linguistic plurality, the English language has always been dominant in the U.S., with standard English holding most power. The struggle to share linguistic power; how questions of gender, race, and class have shaped and responded to language wars. Varieties of English in contemporary fiction, music, and film.
5 units, Win (Lunsford, A)

ENGLISH 261B. Bright Lights, Global Cities: Reading Transnational Asia/Pacific Spatial Geographies
How transnationalism, globalization, and urbanism figure into the work of Asian American and Asian Anglophone writers. Recent debates that pit ethnic studies against area studies. Writers: Jessica Hagedorn, Kazuo Ishiguro, Alvin Lu, Amitav Ghosh, Lawrence Chua, Lan Cao, Karen Tei Yamashita, and Monique Truong.
5 units, Aut (Sohn, S)

ENGLISH 261C. Decolonizing the Novel
The globalization of the novel in English in the second half of the 20th century; the relationship of the Anglophone novel from the global south with metropolitan aesthetic practices such as those of modernism and postmodernism, and with Western and indigenous narrative theories; the politics of colonialism, anti-colonial resistance, and globalization as refracted in the novel as a genre. Texts by Rhys, Naipaul, Tutuola, Achebe, Rushdie, Okrie, Carey, Coetzee, Gordimer, and Ihimaera.
5 units, Win (Majumdar, S)

ENGLISH 262. African American Autobiography
The foundational genre in African American writing. Slave narratives and conventional autobiographies, including Douglass' *Narrative* and Obama's *Dreams from My Father*. Other authors include Booker T. Washington, W.E.B. Du Bois, Richard Wright, Zora Neale Hurston, and Maya Angelou. Autobiography as a Western form, with reference to authors from classical antiquity to the modern age, including St. Augustine, Benjamin Franklin, Sigmund Freud, and Roland Barthes.
5 units, Win (Rampersad, A)

ENGLISH 287. T S Eliot
His poetry, drama, and prose. The formal properties of Eliot's verse, including its wit, metrical and musical structures, use of allusion and pastiche, and its thematic focus on history, city life, fertility, and death. This chameleon-like poet in other guises, such as editor, businessman, literary theorist, and cultural critic.
5 units, Win (Sullivan, H)

ENGLISH 293. Literary Translation
Seminar and workshop. For undergraduates and graduate students. The art and practice of literary translation; its tradition, principles, and questions. Final project is a translation and commentary on work of the student's choosing. Recommended: knowledge of a foreign language and experience in imaginative writing.
3-5 units, Win (Santana, C), Spr (Felstiner, J)

ENGLISH 296. Introduction to Critical Theory: Literary Theory and Criticism Since Plato
Required colloquium for incoming M.A. students. The Anglo-American critical tradition from classical times to the present. Issues include canonicity, gender, imitation, interpretation, and evaluation.
5 units, Aut (Evans, M)

ENGLISH 301A. Medieval Affect
The affective investments of medieval texts. The status and function of emotion and its common companion, imagination, in medieval religious literature (*The Book of Margery Kempe, Julian's Revelations, Pearl*), non-religious literature (Chaucer's *Book of the Duchess, Clerk's Tale*), and philosophy (Aristotle, Aquinas). Approaches to affect in contemporary literary studies. Readings in Middle and modern English.
5 units, Aut (Karnes, M)

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, Aut (Bender, J)

ENGLISH 308B. Gilded Age American Literature
American literature between the Civil War and WWI in relation to major cultural and literary developments such as regionalism, realism, and naturalism, and major political and social questions such as industrialism and economic inequality, race and black civil rights, the increased agitation for women's suffrage, and mass migration from southern and eastern Europe.
5 units, Spr (Jones, G)

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, Win (Parker, P)

ENGLISH 334B. The Modern Traditions II: The Study of Culture in the Age of Globalization
(Same as MTL 334B.) 20th-century theory with focus on the concept of culture and methods of studying it from diverse disciplines including sociology, anthrolopogy, history, literary and cultural studies. Modernization, postmodernization, and globalization in their relations to culture broadly understood, cultures in their regional, national, and diasporic manifestations, and cultures as internally differentiated such as high and low culture, subcultures, and media cultures. Readings include Gramsci, Adorno, Horkheimer, Williams, Hall, Gilroy, Hebdige, Jameson, García Canclini, Foucault, Bourdieu, Geertz, Clifford, Saïd, Appadurai, and Appiah.
5 units, Aut (Heise, U)

ENGLISH 344A. Drama and Poetry: Shakespeare, Marlowe, Jonson
Major playwrights who were also major poets; the relations between text and performance, script and publication, and the drama and the non-dramatic poetry. Stage history and textual matters. Plays include *Doctor Faustus,* the three texts of *Hamlet* and the two of *Troilus and Cressida, Volpone,* and *The Alchemist*. Poetry includes *Venus and Adonis, Lucrece*, the Shakespeare sonnets, Jonson's poems from *The Forest* and *Underwoods, and Hero and Leander*.
5 units, Win (Orgel, S)

ENGLISH 357F. Poetry and Culture in America: Postwar to Cold War
What happened to poetry in English in the wake of high modernism and in the aftermath of global war. Works and controversies from 1945-50 established the form and purview of Anglo-American poetry for the next 25 years. Writers include Eliot, Pound, Auden, Stevens, and Bishop.
5 units, Spr (Jenkins, N)

ENGLISH 361. Memoria: The Arts and Practices of Memory
Goal is to reclaim the canon of *memoria* by reading primary texts in the history of memory and exploring the role memory plays in writing, particularly in the late 20th and early 21st centuries. Students choose focus on how memoria functions in a particular literary period, on a particular theory of memory, or on the functions of memory in a literary text or set of texts.
5 units, Aut (Lunsford, A)

ENGLISH 362S. Phantoms That Follow: Trauma and Disillusionment in Asian American Literature
How Asian American literature emerges through its relationship to oppression, trauma, and disillusionment. Approaches include critical and theoretical archives including psychoanalysis, trauma theory, and cultural studies. Writers may include Alexander Chee, Fae Myenne Ng, Peter Bacho, Suki Kim, Mohsin Hamid, and le thi diem thuy.
5 units, Win (Sohn, S)

ENGLISH 363J. British Aestheticism and Society
How art-for-art's-sake involves or repudiates the political. Major figures of late-Victorian British aestheticism (Pater, Morris, Wilde, and Swinburne); cultural criticism that precedes and flows from it (including Arnold to Adorno). Recurring themes of aesthetic professionalism, art institutions, commodity culture, sexuality, public intellectuals, autonomy, and alienation.
5 units, Win (Rovee, C)

ENGLISH 363P. Twentieth Century Authorship
The theory and practice of authorship in the 20th century beginning with the new critical attack on intentionalism. Mid-century claims about the death of the author. Genetic criticism and a cautious move towards authorial resurrection. Theoretical readings paired with literary texts that address or exemplify the problem of literary authority, including works by Henry James, T. S. Eliot, W. H. Auden, Sylvia Plath, and Philip Roth.
5 units, Spr (Sullivan, H)

ENGLISH 367. British Literature of the 1930s
Goal is to construct a thick description of 30s British literature and culture emphasizing the intersections and conflicts between the public and the private, modernism and mass culture, experimental writing and documentary, word and image, national and international, poetry and prose, collective and individual imagination, utopias and nightmares. The methods, frameworks and sources that are most generative for thinking about the 30s across these divides.
5 units, Win (Jenkins, N; Woloch, A)

ENGLISH 369D. Lost Bestsellers of Victorian Britain
The interplay of the market and form. Theoretical readings and case studies: why were *Pelham*, *The Mysteries of London,* or *The Woman Who Did* so successful? Why was the success so short-lived? Is there a logic to literary history?
5 units, Spr (Moretti, F)

ENGLISH 372. Milton, Revolution, and Restoration
Close reading of Milton's major prose and poetry in the context of the English Civil Wars, the Restoration of the monarchy, and the writings of his contemporaries, from pamphleteers like the Levellers to poets such as Marvell, Dryden, and Lucy Hutchinson.
5 units, Win (Hoxby, B)

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, Spr (Parker, P)

ENGLISH 380. Narratives of Enslavement and Theories of Redress
Literary representations and theories of enslavement, recompense, redemption, and reparation. Goal is to locate what Stephen Best and Saidiya Hartman conceptualize as a redress discourse or an attempt to interrogate the kinds of political claims that can be mobilized on behalf of the slave, the stateless, the socially dead, and the disposable in the political present. Sources include antebellum African American slave narratives and Korean comfort women testimonials.
5 units, Aut (Elam, M)

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 (Gordon, M), 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 (Gigante, D)

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 (except for Comparative Literature students teaching in a foreign language). Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers.
2 units, Aut (Vermeule, B)

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 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 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 and Dissertation Workshop
For third- and fourth-year graduate students in English. Strategies for studying for and passing the oral examination, and for writing and researching dissertations and dissertation proposals. May be repeated for credit.
2 units, Aut (Vermeule, B), Win (Vermeule, B), Spr (Vermeule, B)

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)

OVERSEAS STUDIES COURSES IN ENGLISH

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

KYOTO ENGLISH COURSES

OSPKYOTO 55. Urban Dreams and Nightmares
5 units, Spr (Heise, U)

OSPKYOTO 56. Technology, Ecology, and the Imagination of the future
5 units, Spr (Heise, U)

OXFORD ENGLISH COURSES

OSPOXFRD 17. Novels of Sensation: Gothic, Detective Story, Prohibition, and Transgression in Victorian Fiction
5 units, Spr (Plaskitt, E)

OSPOXFRD 116Z. Close Readings in English Literature, 1642-1740
5 units, Win (Bullard, P)

OSPOXFRD 154Z. Close Readings in English Literature, 1740-1832
5 units, Spr (Crawford, J)

OSPOXFRD 163X. Shakespeare: Critical Commentary
5 units, Aut (Rowley, R)

ENGLISH FOR FOREIGN STUDENTS (EFSLANG) COURSES

These courses, numbered from 690-698, represent offerings for nonnative English-speaking graduate students in Autumn, Winter, and Spring quarters. Enrollment in one or more courses may be required of, or recommended to, current graduate students from other countries after they have taken the English placement examination. To enroll, students must go to http://efs.stanford.edu for directions on or before the first day of each quarter. Some courses are open to undergraduates by consent of the program; email efs@stanford.edu for information. During the Summer Session, courses in spoken and written English are offered. Two six-week intensive courses are also offered during the summer. Summer visitors must apply directly to the EFS program.

UNDERGRADUATE COURSES IN ENGLISH FOR FOREIGN STUDENTS

EFSLANG 197. Directed Study
1-3 units, Aut (Hubbard, P), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN ENGLISH FOR FOREIGN STUDENTS

EFSLANG 397. Directed Study
1-3 units, Aut (Hubbard, P), Win (Staff), Spr (Staff), Sum (Staff)

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 (Staff)

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, Win, 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 (Lockwood, R), Win (Rylance, C), Spr (Streichler, S)

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: 690A or B or consent of instructor. Enrollment limited to 14.

1-3 units, Aut (Romeo, K), Win (Streichler, S), 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 (McPherron, P), Win (McPherron, P), Spr (McPherron, P), 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 (McPherron, P), Spr (Staff), Sum (Shabrami, 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 (Shabrami, C)

EFSLANG 693B. Advanced Listening Comprehension
Listening strategies and vocabulary for understanding English in academic and non-academic contexts. Discussion and interpretation of communicative intent. Computer-based and video exercises; individual project. May be repeated once for credit. Prerequisite: 693A or consent of instructor.

1-3 units. Aut (Streichler, S), Win (Streichler, S), Spr (Hubbard, P), Sum (Staff)

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 (Shabrami, C), Spr (Shabrami, 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 (Rylance, C), Win (Rylance, C), Spr (Rylance, 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, Win (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 (Rylance, C), Spr (Rylance, C)

EFSLANG 698A. Writing Academic English
Strategies and conventions. 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 (Streichler, S), Win (Shabrami, C), Spr (McPherron, P), Sum (Shabrami, C)

EFSLANG 698B. Advanced Graduate Writing
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 (McPherron, P), Win (Staff), Spr (Shabrami, C), Sum (Hubbard, P)

EFSLANG 698C. Writing and Presenting Research
For advanced graduate students completing major research projects. Revising and editing strategies for preparing papers, conference abstracts, and poster presentations. Adapting content and style to different audiences. Students present their research with participant feedback. Enrollment limited to 14. May be repeated once for credit. Prerequisite: 698B and 691 or consent of instructor.

1-3 units, Aut (Shabrami, C), Spr (Shabrami, C)

ENVIRONMENTAL EARTH SYSTEM SCIENCE (EESS) COURSES

For information on graduate programs in Environmental Earth System Science, see the "Environmental Earth System Science" section of this bulletin.

UNDERGRADUATE COURSES IN ENVIRONMENTAL EARTH SYSTEM SCIENCE

EESS 2. Earth System History
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 39N. The Carbon Cycle: Reducing Your Impact
Stanford Introductory Seminar. Preference to freshmen. Changes in the long- and short-term carbon cycle and global climate through the burning of fossil fuels since the Industrial Revolution. How people can shrink their carbon footprints. Long-term sources and sinks of carbon and how they are controlled by tectonics and short-term sources and sinks and the interaction between the biosphere and ocean. How people can shrink their carbon footprints. Held at the Stanford Community Farm. GER:DB-NatSci

3 units, Spr (Chamberlain, P)

EESS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough
Stanford Introductory Seminar. 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 101. Environmental and Geological Field Studies in the Rocky Mountains
(Same as 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; Graham, S)

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 134. Stable Isotopes in Biogeochemistry
(Same as EESS 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, alternate years, not given this year

EESS 143. Marine Biogeochemistry
(Same as EESS 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, Spr (Arrigo, K)

EESS 155. Science of Soils
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 Chemistry
(Same as EESS 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

4 units, Win (Fendorf, S)

EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction
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, Spr (Switzer, P)

EESS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics
(Same as 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 (Boucher, A)

EESS 162. Remote Sensing of Land Use and Land Cover
(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, not given this year

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 (Reilly, M)

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, alternate years, not given this year

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; Micheli, F), alternate years, not given next year

EESS 158. Geomicrobiology
(Same as EESS 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, not given this year

EESS 200. Professional Development in Geoscience Education
(Same as GES 200, GEOPHYS 203.) May be repeated for credit.

1 unit, Aut (Payne, J), Spr (Payne, J)

EESS 217. Tectonics, Topography, and Climate Change
(Formerly GES 287.) For upper-division undergraduates and graduate students. The links between tectonics and climate change with emphasis on the Cenozoic era. Focus is on terrestrial climate records and how they relate to large-scale tectonics of mountain belts. Topics include stable isotope geochemistry, geochronology, chemical weathering, stratigraphy of terrestrial rocks, paleofauna and flora, climate proxies and records, and Cenozoic tectonics. 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; Walker, K)

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 234. Stable Isotopes in Biogeochemistry
(Same as EESS 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)

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; Long, M)

EESS 242. Antarctic Marine Geology
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, alternate years, not given this year

EESS 243. Marine Biogeochemistry
(Same as EESS 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, Spr (Arrigo, K)

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, Spr (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. Prerequisite: familiarity with concepts presented in GEOPHYS 130/231 or equivalent. (Arrigo)

3-4 units, Aut (Arrigo, K)

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 Chemistry
(Same as EESS 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.

4 units, Win (Fendorf, S)

EESS 258. Geomicrobiology
(Same as EESS 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, not given this 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 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all

departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

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 (Fendorf, S), 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, Aut (Gorelick, S), Win (Gorelick, S), Spr (Gorelick, S)

EESS 342. Geostatistics
Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.

1-2 units, Aut (Boucher, A)

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 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)

ETHICS IN SOCIETY (ETHICSOC) COURSES

For information on the undergraduate minor and honors program in Ethics in Society, see the " Ethics in Society" section of this bulletin.

UNDERGRADUATE COURSES IN ETHICS IN SOCIETY

ETHICSOC 20. Introduction to Moral Philosophy
(Same as PHIL 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. GER:DB-Hum, EC-EthicReas

5 units, Win (Schapiro, T)

ETHICSOC 30. Introduction to Political Philosophy
(Same as PHIL 30, POLISCI 3, PUBLPOL 103A.) State authority, justice, liberty, and equality through major works in political philosophy. Topics include human nature and citizenship, the obligation to obey the law, democracy and economic inequality, equality of opportunity and affirmative action, religion, and politics. GER:DB-Hum, DB-Hum, EC-EthicReas

5 units, Spr (Hussain, N)

ETHICSOC 77. Methodology in Ethics: Translating Theory into Practice
(Same as PHIL 77.) Ideally, social policies are informed by ethical thought and reflection, but doing good in the world requires the active translation of moral theory and political philosophy into action. What kinds of empirical data are relevant to social decision making, and how should they be collected, evaluated, and integrated into normative analysis? What assumptions about human nature are in play? How should diverse cultural values be addressed? Case studies from biomedical science, business, and government.

4 units, not given this year

ETHICSOC 78. Medical Ethics
(Same as PHIL 78.) Introduction to moral reasoning and its application to problems in medicine: informed consent, the requirements and limits of respect for patients' autonomy, surrogate decision making, euthanasia and physician-assisted suicide, and abortion. GER:DB-Hum, DB-Hum, EC-EthicReas

4 units, not given this year

ETHICSOC 133. Ethics and Politics of Public Service
(Same as 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, given next year

ETHICSOC 136R. Introduction to Global Justice
(Same as INTNLREL 136R, POLISCI 136R, POLISCI 336.) Recent work in political theory on the ethics of international relations. Topics include human rights, global economic justice, and the problem of global poverty.

5 units, Spr (Staff)

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, Aut (Reich, R; Steyer, J)

ETHICSOC 170. Ethical Theory
(Same as PHIL 170, PHIL 270.) Major strands in contemporary ethical theory. Readings include Bentham, Mill, Kant, and contemporary authors. GER:DB-Hum, EC-EthicReas

4 units, Aut (Schapiro, T)

ETHICSOC 171. Justice
(Same as IPS 208, PHIL 171, PHIL 271, POLISCI 136S, PUBLPOL 207.) 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, Win (Satz, D)

ETHICSOC 179M. Libertarianism, Egalitarianism, and Public Policy
Evaluation of libertarian arguments about public policy, rights of ownership and rights of liberty such as: whether it is unjust to tax some persons' market incomes in order to provide benefits for others; whether such taxation is a form of theft; whether such taxation is morally equivalent to forcing some persons to work for others; and whether the minimum wage is an unjust restriction of persons' freedom to make mutually voluntary contracts. Readings include: Nozick, Milton Friedman, Hayek, and G.A. Cohen.
4 units, Win (Mchose, J)

ETHICSOC 181M. The Ethics of Risk
Why is it sometimes permissible to risk a harm when causing that same harm for certain would be wrong? Ethical issues involved in making decisions to act under conditions of risk and uncertainty. Topics include the nature of risk, the ethics of imposing risks on oneself and others, and the implications of different ethical views about risk for questions of public policy. Readings from philosophy, economics, law, and cognitive psychology.
4 units, Win (Staff)

ETHICSOC 185M. Contemporary Moral Problems
Moral problems faced by individuals and societies. Topics include global poverty, access to education, punishment, and abortion. Do affluent individuals have a duty to aid poor foreigners? How might such a duty depend on whether others are doing their share? Can people harm others through inaction? Should society punish successful crimes more severely than failed attempts? Contemporary philosophical writings including Feinberg, Thomson, Unger, Wolff.
4 units, Aut (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)

FEMINIST STUDIES (FEMST) COURSES

For information on undergraduate programs in Feminist Studies, see the "Feminist Studies" section of this bulletin.

UNDERGRADUATE COURSES IN FEMINIST STUDIES

FEMST 101. Introduction to Feminist Studies
(Same as HISTORY 107.) What is feminism and why does it matter today? Debates over the status and meaning of feminism in the 21st century. Feminist theories and practices across topics that intersect with gender inequality such as race, health, socioeconomics, sexual orientation, international perspectives, new media, civil rights, and political change. Perspectives from philosophy, education, visual culture, literary and ethnic studies, performance and expressive arts, and social sciences. GER:DB-SocSci, EC-Gender
5 units, Aut (Freedman, E)

FEMST 103. Feminist Theories and Methods Across the Disciplines
(Same as 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. GER:EC-Gender
4-5 units, Aut (Longino, H)

FEMST 104A. Junior Seminar and Practicum
Required of Feminist Studies majors. Preparation for practicum projects. How to identify goals, submit grant proposals, and negotiate ethical issues in feminist praxis. The relationship between potential projects and their academic focus in the major.
1 unit, Win (Coll, K)

FEMST 104B. Senior Seminar and Practicum
For Feminist Studies majors only. Students present oral reports on the relation of the practicum to their academic work, submit a 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
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 women's organizations. One unit represents approximately three hours work per week. Required paper. May be repeated for credit. 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
Gay, lesbian, bisexual, transgender, transsexual, and queer political movement and theory; sexual identities and feminism; sexual identities and cultural representation; alternative family practices; queer theory in academia. Film screenings, guest speakers, and community field trips. GER:EC-Gender
4-5 units, Win (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, Spr (Karlin-Neumann, P)

FEMST 140J. Black Feminist Theory
Historical examination of Black women's interventions from mid-19th century to present in U.S. movements for racial and gender justic; their interventions in feminist epistemology, sexual politics, cultural criticism, critical race theory, movement politics and discussions of subjectivity, identity, and agency.
4-5 units, Win (Bierria, A)

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: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. Preference to sophomores. Contemporary literature through recent texts and conversations with the authors including Stanford faculty and visiting writers. Analytical and creative writing. Writing experience not necessary.Preference to sophomores. Contemporary literature through recent texts and conversations with the authors including Stanford faculty and visiting writers. Analytical and creative writing. Prerequisite: PWR 1. GER:DB-Hum
4-5 units, Win (Miner, V)

FEMST 191Q. Writing Women's Lives
(F,Dial) 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.
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.) Topics include invisible disabilities and identities, sexualities, access, caretaking, self-definition, stigma and passing, and women's psychological as well as physical health. Prerequisite: consent of instructor. GER:DB-SocSci, EC-Gender
5 units, Spr (Krieger, S)

FEMST 260B. The Politics of Language
(Same as ENGLISH 260B.) While the U.S. was founded on principles of linguistic plurality, the English language has always been dominant in the U.S., with standard English holding most power. The struggle to share linguistic power; how questions of gender, race, and class have shaped and responded to language wars. Varieties of English in contemporary fiction, music, and film. GER:DB-Hum
5 units, Win (Lunsford, A)

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.) The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research.
4-5 units, Aut (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.) Topics include invisible disabilities and identities, sexualities, access, caretaking, self-definition, stigma and passing, and women's psychological as well as physical health. Prerequisite: consent of instructor.
5 units, Spr (Krieger, S)

OVERSEAS STUDIES COURSES IN FEMINIST STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE FEMINIST STUDIES COURSES

OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image
4 units, Spr (Campani, E)

FILM STUDIES (FILMSTUD) COURSES

For information on undergraduate and graduate programs in Film and Media Studies, see the "Art and Art History" section of this bulletin.

FILM STUDIES COURSE CATALOG NUMBERING SYSTEM

The first digit of the FILMSTUD course number indicates its general level of sophistication.

1- 99	Introductory
100-199	Undergraduate level
200-299	Undergraduate seminars/individual work
300-399	Graduate level
400-599	Graduate seminars/individual work

The numbers below indicate the area of Film Studies it addresses.

004-103	Introductory
111-118	Genre
130-139	National Cinemas
140-149	Aesthetics
150-159	Other
220-299	Seminars
400-660	Graduate Seminars

UNDERGRADUATE COURSES IN FILM STUDIES

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 (Staff)

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
4 units, Aut (Bukatman, S)

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, WIM
4 units, Spr (Ma, J)

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 114. Comics: A Lively Art
(Same as FILMSTUD 314.) History and aesthetics of comics in relation to emerging mass media and modernist and postmodernist aesthetic and narrative practices. Focus is on innovators in humorous and dramatic strips, superheroes, undergrounds and independents, political commentary, and autobiography. 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 130. Italian Cinema: Neorealism and Beyond
(Same as FILMSTUD 330.) The post-WW II era. Aesthetic and sociopolitical dimensions of neorealism; 60s cinema of economic miracle; and Italian variations on popular film genres such as the spaghetti western. Filmmakers include Rossellini, De Sica, Visconti, Pasolini, and Antonioni. GER:DB-Hum
4 units, not given this year

FILMSTUD 131. Politics and Aesthetics in East European Cinema
(Same as FILMSTUD 331.) 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 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.
4 units, Spr (Staff)

FILMSTUD 144. Experimental Video Workshop
(Same as FILMSTUD 344.) Theory and practice of the moving image. Students work on video exercises and experiments as applied theory: attempts at practically implementing, verifying, or challenging ideas about sound, image, and performance. Prerequisites: FILMPROD 114 or equivalent, and consent of instructor.
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
4 units, Win (Bukatman, S)

FILMSTUD 152. Cinema-Machine
(Same as FILMSTUD 352.) The film medium as culmination of the industrial and electronic revolutions of the 19th and 20th centuries, and the apotheosis of modernist impulses around the problematic of a perfect vision and visibility. The ideal of cinema in relation to its technological basis: the film apparatus as mechanical artifact, desiring machine, phenomenological toy, and instrument of knowledge. Screenings. GER:DB-Hum
4 units, not given this year

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, Spr (Bukatman, S)

FILMSTUD 230. Cinema and Ideology
The relationship between cinema and ideology from theoretical and historical perspectives, emphasizing Marxist and psychoanalytic approaches. The practice of political filmmaking, and the cinema as an audiovisual apparatus and socio-cultural institution. Topics include: dialectics; revolutionary aesthetics; language and power; commodity fetishism; and nationalism. Filmmakers include Dziga Vertov, Jean-Luc Godard, Bruce Conner, and Marco Ferreri. Theoretical writers include Karl Marx, Sergei Eisenstein, and Slavoj Zizek. Prerequisite: consent of instructor.
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, Aut (Ma, J)

FILMSTUD 290. Senior Seminar: Movies and Methods
Capstone course for majors. Topics vary year to year. Focus is on historiography and theory.
5 units, Win (Ma, J)

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

For graduate students only.

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, Aut (Bukatman, S)

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 (Ma, J)

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 314. Comics: A Lively Art
(Same as FILMSTUD 114.) History and aesthetics of comics in relation to emerging mass media and modernist and postmodernist aesthetic and narrative practices. Focus is on innovators in humorous and dramatic strips, superheroes, undergrounds and independents, political commentary, and autobiography.
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 330. Italian Cinema: Neorealism and Beyond
(Same as FILMSTUD 130.) The post-WW II era. Aesthetic and sociopolitical dimensions of neorealism; 60s cinema of economic miracle; and Italian variations on popular film genres such as the spaghetti western. Filmmakers include Rossellini, De Sica, Visconti, Pasolini, and Antonioni.
4 units, not given this year

FILMSTUD 331. Politics and Aesthetics in East European Cinema
(Same as FILMSTUD 131.) 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 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, Spr (Staff)

FILMSTUD 344. Experimental Video Workshop
(Same as FILMSTUD 144.) Theory and practice of the moving image. Students work on video exercises and experiments as applied theory: attempts at practically implementing, verifying, or challenging ideas about sound, image, and performance. Prerequisites: FILMPROD 114 or equivalent, and consent of instructor.
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, Win (Bukatman, S)

FILMSTUD 352. Cinema-Machine
(Same as FILMSTUD 152.) The film medium as culmination of the industrial and electronic revolutions of the 19th and 20th centuries, and the apotheosis of modernist impulses around the problematic of a perfect vision and visibility. The ideal of cinema in relation to its technological basis: the film apparatus as mechanical artifact, desiring machine, phenomenological toy, and instrument of knowledge. Screenings.
4 units, not given this year

FILMSTUD 400. Cinema and Surrealist Imagination
Theoeretical and practical approaches to cinema in the framework of ideas and aesthetic principles pursued by 20s and 30s European writers and artists associated with Dada and Surrealism. Forms of avant garde filmmaking and cine-writing engaged in a rebellion against reason and logic, and invested in explorations of the unconscious through automatism, oneirism, chance, and visualization of desire. Writers include Breton, Bataille, and Artaud; filmmakers include Buñuel, Dali, Man Ray, and Duchamp.
5 units, not given this year

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, 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, Aut (Ma, J)

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 (Krawitz, J)

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 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)

OVERSEAS STUDIES COURSES IN FILM STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN FILM STUDIES COURSES

OSPBER 17. Split Images: A Century of Cinema
4 units, Win (Kramer, K)

OSPBER 55. Filmed Experience: Berlin at Eye-Level
5 units, Spr (Maerker, C)

FLORENCE FILM STUDIES COURSES

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
5 units, Win (Campani, E)

OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image
4 units, Spr (Campani, E)

OSPFLOR 134F. Modernist Italian Cinema
5 units, Aut (Campani, E)

FILM, PRACTICE OF (FILMPROD) COURSES

For information on undergraduate and graduate programs in Film and Media Studies, see the "Art and Art History" section of this bulletin.

UNDERGRADUATE COURSES IN FILM, PRACTICE OF

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 (Staff)

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 (Symons, J), Spr (Symons, J)

GRADUATE COURSES IN FILM, PRACTICE OF

For graduate students only.

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 (Staff)

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 (Meltzer, 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 (Krawitz, J)

FRENCH GENERAL (FRENGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of French. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in French, see the "French and Italian" section of this bulletin. For courses in French language instruction, see "French Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN FRENCH GENERAL

FRENGEN 45N. American Writers in 20th-Century Paris
Stanford Introductory Seminar. Preference to freshmen. A crosscultural inquiry into Paris as a part of American culture, a myth, a longing, and source of inspiration. Role of artistic movements (Cubism, Surrealism, Existentialism) and cultural institutions such as the cafés, libraries, 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. Readings: Gertrude Stein, Hemingway, Fitzgerald, Anaïs Nin, and Baldwin. In English. GER:DB-Hum
3-4 units, Win (Alduy, C)

FRENGEN 122. Literature as Performance
(Same as COMPLIT 122.) 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
3-5 units, Win (Gumbrecht, H)

FRENGEN 181. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

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, Spr (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. GER:DB-Hum, EC-Gender
3-5 units, alternate years, not given this year

FRENGEN 211. Albert Camus and Jean-Paul Sartre: French Existentialism in the Post-World War II Period
(Same as COMPLIT 211.) Philosophical and literary works of two of the most widely read and canonized authors of the mid-20th century. The texts and times of French existentialism, and changing relationships to this tradition. Prerequisite: reading knowledge of French. GER:DB-Hum
3-5 units, Win (Gumbrecht, H)

GRADUATE COURSES IN FRENCH GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FRENGEN 204. Love Songs
(Same as ITALGEN 204.) Medieval love lyric in the old Occitan, Italian, middle high German, and Galician-Portuguese traditions, focusing on deictic address, corporeal and metaphysical subjectivity, the female voice, dialogue songs of ambivalent gender, and the modern translation and reception of the troubadour tradition. Poets include Sappho, Bernart de Ventadorn, La Comtessa de Dia, Walther von der Vogelweide, Dante, Petrarch, Pound, Larkin, and Neruda.
3-5 units, Aut (Galvez, M)

FRENGEN 215. Gottfried Benn and Francis Ponge: Mid-20th-Century European Poetry and the Problem of the Referent
(Same as COMPLIT 215A, GERLIT 215.) Comparative readings of the two poets in their respective national contexts, with attention to biographical and poetological frameworks. Canonic status and scholarly reception histories. Renewed interest in their work with regard to their distinctive practices of connecting prosodic form and extra textual referents. Prerequisite: reading knowledge of German or French.
3-5 units, Aut (Gumbrecht, H)

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, Spr (Alduy, C)

FRENGEN 232. Time of Latency: Western Cultures in the Decade After 1945
(Same as COMPLIT 232A, ITALGEN 232.) Retrospective accounts and contemporary experience converge in the description of the decade following 1945 as a period of quietude that seemed to repress an unknown trauma. Goal is to reconstruct the mood of this historical moment and its relationship to the early 21st century. Sources include canonical texts and everyday documents from different national and cultural contexts. Advanced undergrads require consent of instructor.
3-5 units, Aut (Gumbrecht, H)

FRENGEN 233. The Afterlife of the Middle Ages
Literary works that evoke a medieval past in contrast to a historical present, and critical texts that treat aspects of the medieval or medievalism. How does the concept of medievalism emerge and evolve through the ages? The impact of the Reformation and romanticism, the study of Gothic architecture, and the use of the term medieval in modern political discourse. Authors include Hugo, Grimm brothers, Flaubert, Mâle, Pound, de Rougemont, Eco, Bataille, and Holsinger; films by Bresson and Pasolini.
3-5 units, Win (Galvez, M)

FRENGEN 265. The Problem of Evil in Literature, Film, and Philosophy
(Same as POLISCI 338E.) Conceptions of evil and its nature and source, distinctions between natural and moral evil, and what belongs to God versus to the human race have undergone transformations reflected in literature and film. Sources include Rousseau's response to the 1755 Lisbon earthquake; Hannah Arendt's interpretation of Auschwitz; Günther Anders' reading of Hiroshima; and current reflections on looming climatic and nuclear disasters. Readings from Rousseau, Kant, Dostoevsky, Arendt, Anders, Jonas, Camus, Ricoeur, Houellebecq, Girard. Films by Lang, Bergman, Losey, Hitchcock.
3-5 units, Spr (Dupuy, J)

FRENGEN 285. The Gaze of Medusa: Literature and Photography and the Case of Michel Tournier
The effect of the invention of photography and its optical and chemical technologies on the literary imagination. A new language and a new set of metaphors. Anthropological, religious, and cultural attitudes toward the reproduction of the human image. Michel Tournier's essays on photography, his books in collaboration with famous photographers, and his novels and stories. Analogies and differences. Readings from Henry James, Julio Cortázar, Antonio Tabucchi. In English.
3-5 units, Win (Ceserani, R)

FRENGEN 288. Decadence and Modernism from Mallarmé to Marinetti
(Same as ITALGEN 288.) How the notion of decadence, initially a term of derision, shapes and underlies the positive terms of symbolism and modernism. Readings include theories of decadence and examples of symbolist and modernist texts that attempt to exorcise decadent demons, such as lust, mysticism, and the retreat into artificiality. Authors include Huysmans, Poe, Mallarmé, Nietzsche, Nordau, d'Annunzio, Valry, Ungaretti, Marinetti, and Breton.
3-5 units, Spr (Wittman, L)

FRENGEN 367. Violence: The Sacred and Rights of the Dead
(Same as ANTHRO 337A.) The politics of dead bodies as key issue in the humanities during recent decades that link scholars from various disciplines. Contemporary examples of reburial practices of indigenous people, exhumation of disappeared bodies in Latin America, exhibitions of human remains, representation of dead bodies in art, and recent developments in the funerary practices (LifeGem, Biopresence). Rene Girard's theory of the relationship between violence and the sacred.
3-5 units, Spr (Domanska, E)

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), Spr (Gumbrecht, H)

FRENCH LANGUAGE (FRENLANG) COURSES

Students who have never studied French before should enroll in FRENLANG 1. Students with previous training in French must take a placement test. All entering students must take Part I (written) of the online placement test during the summer, followed by Part II (oral) to be adminis-tered on campus September 17, 2008, in order to be placed in an appropriate course for Autumn Quarter. Consult the Language Center or http://language.stanford.edu/ for further information. FRENLANG 2A, 3, and 5B, prepare students for intermediate-level proficiency in listening comprehension, speaking, reading, and writing in satisfaction of the University foreign language requirement. Students may continue with second-year French language courses (22 or 23) or higher-level courses upon completion of the first-year sequence and recommendation of the coordinator. A grade of 'C' or better is required to enter the next course in a language sequence. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN FRENCH LANGUAGE

FRENLANG 1. First-Year French, First Quarter
Proficiency-based. Development of discourse appropriate in French and Francophone contexts.
5 units, Aut (Giachetti, L), Win (Shashko, T), Spr (Dozer-Rabedeau, J)

FRENLANG 1A. Intensive First-Year French, Part A
Completes first-year language sequence in two rather than three quarters. Recommended for students with previous knowledge of French who place into 5A on the placement test. 2A fulfills the University foreign language requirement. Prerequisite: French placement test and consent of instructor.
5 units, Aut (Eram, C), Win (Shashko, T)

FRENLANG 2. First-Year French, Second Quarter
Proficiency-based. Development of discourse appropriate in French and Francophone contexts.
5 units, Aut (Shashko, T), Win (Giachetti, L), Spr (Shashko, T)

FRENLANG 2A. Intensive First-Year French, Part B
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. 2A fulfills the University foreign language requirement. Prerequisite: French placement test and consent of instructor.
5 units, Win (Howard, H), Spr (Gilleland, J)

FRENLANG 3. First-Year French, Third Quarter
Proficiency-based. Development of discourse appropriate in French and Francophone contexts.
5 units, Aut (Dozer-Rabedeau, J), Win (Dozer-Rabedeau, J), Spr (Giachetti, L)

FRENLANG 5A. Intensive First-Year French, Part A
Accelerated. Written exercises, compositions, conversational practice, and daily work.
5 units, Sum (Staff)

FRENLANG 5B. Intensive First-Year French, Part B
Accelerated. Written exercises, compositions, conversational practice, and daily work.
5 units, Sum (Staff)

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 (Shashko, T), Spr (Howard, H)

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 (Shashko, T), Spr (Howard, H)

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, Sum (Dozer-Rabedeau, J)

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 22. Second-Year French, Part A
Proficiency-based. Advanced-level skills including past, present, and future narration, description, and defending points of view on social and cultural issues. Topics from cultural comparisons with French and Francophone contexts. Prerequisite: 3 or consent of coordinator.
4-5 units, Aut (Conroy, M), Win (Samokhina, D), Spr (Dozer-Rabedeau, J)

FRENLANG 23. Second-Year French, Part B
Proficiency-based. Advanced-level skills including past, present, and future narration, description, and defending points of view on social and cultural issues. Topics from cultural comparisons with French and Francophone contexts. Prerequisite: 3 or consent of coordinator.
4-5 units, Aut (Howard, H), Win (Dozer-Rabedeau, J), Spr (Lasnier, 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, Spr (Dozer-Rabedeau, J)

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, Win (Howard, H)

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 (Gilleland, J)

FRENLANG 50S. Reading French
Same content as 50.
2-4 units, Sum (Ashaolu, O)

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)
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), Spr (de Castries, P)

FRENLANG 60F. French Cinema
May be repeated for credit. (AU)
1 unit, Win (de Castries, P)

FRENLANG 60K. Thought for the 21st Century (AU)
1 unit, not given this year

FRENLANG 60N. French Drama (AU)
1 unit, Spr (de Castries, P)

FRENLANG 60P. French House Projects
Prerequisite: consent of instructor. (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, Aut (Palumbo-Liu, S)

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)

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, Win (Palumbo-Liu, S)

FRENLANG 126. French Stylistics and Textual Analysis
For majors and minors. Writing intensive. Control of grammar and syntax in research and argumentative papers. Prerequisite 124 or placement.
3-4 units, Spr (Tamas, J)

FRENLANG 199. Language Specials
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN FRENCH LANGUAGE

For graduate students only.

FRENLANG 33G. Business French III
For GSB students only. Enrollment limited to 18.
4 units, not given this year

FRENLANG 205A. Intensive First-Year French
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.
4-5 units, not given this year

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)

OVERSEAS STUDIES COURSES IN FRENCH LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

PARIS FRENCH LANGUAGE COURSES

OSPPARIS 22P. Intermediate French I
4 units, Aut (Reychman, P), Win (Mercier, F), Spr (Reychman, P)

OSPPARIS 23P. Intermediate French II
4 units, Aut (Mercier, F), Win (Gourevitch, S), Spr (Habert, L)

OSPPARIS 124P. Advanced French I
4 units, Aut (Guedon, P)

OSPPARIS 125P. Advanced French II
4 units, Win (Molkou, E), Spr (Molkou, E)

FRENCH LITERATURE (FRENLIT) COURSES

These courses typically require knowledge of French. For information on undergraduate and graduate programs in French, see the "French and Italian" section of this bulletin.

UNDERGRADUATE COURSES IN FRENCH LITERATURE

These courses typically require knowledge of French. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in French, see the French and Italian" section of this bulletin. For courses in French language instruction, see "French Language" courses section of this bulletin.

FRENLIT 130. Authorship, Book Culture, and National Identity in Medieval and Renaissance France
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 (Galvez, M)

FRENLIT 131. Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France
The literature, culture, and politics of France from Louis XIV to Rousseau. How this period produced the political and philosophical foundations of modernity. Readings include Bodin, Hobbes, Racine, Lafayette, Locke, Voltaire, Diderot, Rousseau, and Beaumarchais. Prerequisite: FRENLANG 126 or consent of instructor. GER:DB-Hum, WIM
4 units, Win (Tamas, J)

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, Win (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, Spr (Boyi, E)

FRENLIT 151. 19th-Century Realism: Balzac Versus Flaubert
What is realism? Is cynicism more realistic than idealism? The French realist novel in its literary historical milieu; methods by which realist authors created an *effet de réel*. Philosophical shifts that motivated realism. Focus is on stylistic conventions and formal qualities of realist prose. Readings: novels by Honoré de Balzac and Gustave Flaubert, and secondary readings from 20th-century criticism and theories of realism. In French. GER:DB-Hum
3-5 units, Spr (Elghoroury, A)

FRENLIT 165. The French Short Story, 1690-1780
From fairytale to conte libertin, a century of fantastic stories. From 1690, how classical authors, folktale writers, translators of oriental fictions, aristocrats, and femmes du monde produce a corpus of short stories especially in the Parisian salon. The evolution of story writing through sources including: texts by Voltaire, Rousseau, and Diderot; translation of the *Arabian Nights* by Antoine Galland; and tales such as Cinderella and Beauty and the Beast. In French. GER:DB-Hum
3-5 units, Aut (Calefas-Strebelle, A)

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)

GRADUATE COURSES IN FRENCH LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

FRENLIT 207. Writing Utopia in 18th- and 19th-Century France
Themes and ideas in portrayals of alternative societies. Political, moral, and scientific questions that challenge the cultural context. Readings of positive (utopian) and negative (dystopian) works include: Denis Diderot, *Le Voyage de Bougainville;* Voltaire, *Micromégas*; Louis-Sébastien Mercier, *L'An 2440;* Saint-Simon, *Lettre d'un habitant de Genève à ses contemporains;* Fourier, *Le nouveau monde amoureux;* Jules Verne, *Paris au XXe siècle*.
3-5 units, Aut (Castonguay-Bélanger, J)

FRENLIT 222. The Political Unconscious of the Ancien Régime
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, Aut (Apostolides, J)

FRENLIT 224. Libertinage in 17th- and 18th-Century French Literature
Intellectual, political, and cultural history of France. The distinction between the intellectual and philosophical libertinage of the classical age and a moral libertinage more specific to the 18th century. Readings of representative works of libertine literature include Cyrano de Bergerac and Théophile de Viau, *Les égarements du coeur et de l'esprit from Crebillon*, *Les liaisons dangereuses* from Laclos, and *Point de lendemain* from Vivant Denon.
3-5 units, Win (Castonguay-Bélanger, J)

FRENLIT 225. Multicultural Molière
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, Spr (Apostolides, J)

FRENLIT 247. Science and Literary Discourse in 19th-Century France
How the sociopolitical intertwines with scientific fact on the literary canvas. Representations of contemporaneous technological inventions and scientific discoveries; modes of appropriating science and scientific discourse in literary production. Balzac, Sand, Zola, Villiers de l'Isle-Adam, Cros, Valéry.
3-5 units, Win (Joseph, R)

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, Win (Boyi, E)

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, Spr (Wittman, L)

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)

OVERSEAS STUDIES COURSES IN FRENCH LITERATURE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

PARIS FRENCH LITERATURE COURSES

OSPPARIS 25. Literature and the City
4 units, Aut (Guyot, S)

OSPPARIS 186F. Contemporary African Literature in French
4 units, Win (Guyot, S)

GENETICS (GENE) COURSES

For information on graduate programs in the Department of Genetics, see the "Genetics" section of this bulletin. Additional courses in or related to genetics are included in the deaprtments of Biology, Biochemistry, Developmental Biology, Microbiology and Immunology, Neuroscience, Biomedical Informatics, and Structural Biology.

UNDERGRADUATE COURSES IN GENETICS

GENE 109Q. Genomics: A Technical and Cultural Revolution
(S,Sem Same as BIOMEDIN 109Q.) Stanford Introductory Seminar. Preference to sophomores. For non-science majors. 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; Barsh, G; Sidow, A)

GENE 206. Epigenetics
(Same as PATH 206.) For graduate students; undergraduates by consent of instructor. 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 20s 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: background in genetics and molecular biology.
2 units, alternate years, not given this year

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; Myers, R; Sidow, A; 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: 210, 211 or 214, or consent of instructor.
3 units, Aut (Altman, R; Cheng, B; Klein, T)

GENE 214. Representations and Algorithms for Computational Molecular Biology
(Same as BIOE 214, BIOMEDIN 214, CS 274.) Topics: algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, computing with networks of genes, 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, graphical display of biological data, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units.
3-4 units, Spr (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 hosted by Biochemistry, Developmental Biology, and Genetics in which distinguished 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; Tan, M; Villeneuve, A), Win (Harbury, P; Tan, M; Villeneuve, A)

GENE 221. Current Issues in Aging
(Same as DBIO 221, NENS 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; Rando, T)

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; Calos, M)

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, 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 238. Current Concepts and Dilemmas in Genetic Testing
(Same as INDE 238.) Issues arising from the translational process from research to commercialization. Diagnostic inventions and applications, community implications, newborn screening, cancer genetics, and pharmacogenomics. Guest experts. For M.D., biomedical graduate, and genetic counseling students.

2 units, Spr (Tobin, S; Schrijver, I; Cowan, T; Magnus, D)

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, alternate years, not given this 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, Spr (Tang, H; Zhang, N)

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, and gene therapy, proteomics, stem cell biology, and pharmacogenetics. Undergraduates require consent of instructor and a basic genetics course.

4 units, Aut (Ormond, K; 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 paper 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 postdoctoral 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 paper is required for 3 units.

2-3 units, Aut (Ormond, K; Cowan, T; Cherry, A; Schrijver, I)

GENE 274A. A Case Based Approach to Clinical Genetics
For genetic counseling students, graduate students in genetics, medical students, residents, and post-doctoral fellows. Case-based scenarios and guest expert lectures. Skills in case preparation, management, and presentation.

2 units, Win (Staff)

GENE 274B. A Case Based Approach to Clinical Genetics
For genetic counseling students, graduate students in genetics, medical students, residents, and post-doctoral fellows. Case-based scenarios and guest expert lectures. Skills in case preparation, management, and presentation.

2 units, Spr (Hudgins, L; Ormond, K)

GENE 275. Role Play and Genetic Counseling Observations
Observation includes genetic counseling sessions in prenatal, pediatric, and cancer settings, and medical genetics procedures and testing settings.

2 units, Aut (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), Win (Ormond, K), Spr (Ormond, K), Sum (Ormond, K)

GENE 278. Prenatal Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and postdoctoral 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 postdoctoral 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 (Ormond, K), Win (Ormond, K), Spr (Ormond, K), Sum (Ormond, K)

GENE 280. Metabolic Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and postdoctoral fellows; genetic counseling students should take this course in

conjunction with their metabolic genetics rotation. Overview of metabolic diseases; common pathways; diagnosis, management, and treatment of metabolic disorders; and newborn screening.

1 unit, Aut, Win, Spr, Sum (Ormond, K)

GENE 281. Cancer Genetic Counseling
Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and postdoctoral fellows; genetic counseling students should take this course in conjunction with their initial cancer genetics rotation. Topics include: cancer cytogenetics and genetic principles; 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 282. Genetic Counseling Research Seminar
For genetic counseling students only. Facilitated discussions on identifying a topic and mentor for genetic counseling departmental research projects. Corequiste: GENE 299.

2 units, Win (Staff)

GENE 282. Genetic Counseling Research Seminar
For genetic counseling students only. Facilitated discussions on identifying a topic and mentor for genetic counseling departmental research projects. Corequiste: GENE 299.

2 units, Win (Ormond, K)

GENE 283. Genetic Counseling Research
Investigations sponsored by individual faculty members. Students complete an approved research project. May be repeated for credit. Prerequisite:GENE 282.

1-8 units, Aut (Ormond, K), Win (Ormond, K), Spr (Ormond, K), Sum (Ormond, K)

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 (Ormond, K), Win (Ormond, K), Spr (Ormond, K)

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: 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 through 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)

GENE 286B. Advanced Genetic Counseling Seminar
Continuation of GENE 286A. For genetic counseling students only. Psychosocial issues associated with genetic counseling cases through 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)

GENE 286C. Advanced Genetic Counseling Seminar
Continuation of 286A/B. For genetic counseling students only. Psychosocial issues associated with genetic counseling cases through 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)

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)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES (GES) COURSES

For information on undergraduate and graduate programs in the Department of Geological and Environmental Sciences, see the "Geological and Environmental Sciences" section of this bulletin.

UNDERGRADUATE COURSES IN GEOLOGICAL AND ENVIRONMENTAL SCIENCES

GES 1. Dynamic Earth: Fundamentals of Earth Science
For non-majors or prospective majors in the Earth Sciences. Activity-based; field trips. Focus is on reading the dynamic geological landscape, with an emphasis on California geology. Plate tectonics, earthquakes and volcanoes, earth materials, geologic time, stream processes, erosion, climate change, and natural resources. GER:DB-NatSci

4 units, Aut (Hilley, G), Spr (Egger, A)

GES 3. Current Research Topics in Earth and Environmental Sciences
Primarily for freshmen and sophomores. Introduction to faculty and research areas in the School of Earth Sciences, including biogeochemistry, oceanography, paleobiology, geophysics, tectonics, geostatistics, soil science, hydrogeology, energy resources, earth surface processes, geochronology, earth materials, and seismology. May be repeated for credit.

1 unit, Aut (Egger, A), Win (Egger, A)

GES 4. Extinction of the Dinosaurs: An Introduction to the Study of Earth History
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, Win (Payne, J)

GES 7A. 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, 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. The Oceans: 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, Spr (Ingle, J), Sum (Ingle, J)

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, Spr (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. 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)

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.) 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; Graham, S)

GES 102. Earth Materials
The minerals, rocks, soils, and liquids that comprise the earth. How to identify, classify, and interpret rock-forming minerals and igneous, metamorphic, and sedimentary rock types. Emphasis is on information provided by common minerals and rocks about the earth's major processes including magmatism, metamorphism, weathering, erosion, and deposition; the relationship of these processes to plate tectonics and earth cycles. Prerequisite: introductory geology course. Recommended: introductory chemistry. GER:DB-NatSci

5 units, Aut (Brown, G; Mahood, G)

GES 103. 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 107. Journey to the Center of the Earth
(Same as GES 207, GEOPHYS 107, GEOPHYS 207.) 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, Win (Lawrence, J; Mao, W)

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

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 112. Mapping the Geological Environment
Geological mapping tools and techniques. Field training with GPS and laser ranging tools. Data sets from modern surveying and mapping campaigns employing lab and field-based laser scanning, field-based total stations, airborne photography and laser swath mapping (ALSM), the satellite Global Positioning System (GPS), and 3D seismic reflection surveys. These data analyzed using elementary differential geometry. MATLAB introduced as the computational and graphics engine. Prerequisites: GES 1, MATH 51, 52. GER:DB-NatSci

3 units, given next year

GES 115. Engineering Geology Practice
(Same as CEE 196.) The application of geologic fundamentals to the planning and design of civil engineering projects. Field exercises and case studies emphasize the impact of site geology on the planning, design, and construction of civil works such as buildings, foundations, transportation facilities, excavations, tunnels and underground storage space, and water supply facilities. Topics: Quaternary history and tectonics, formation and physical properties of surficial deposits, site investigation techniques, geologic hazards, 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?
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 (Marley, M; Lissauer, J; 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, not given this year

GES 123. Invertebrate Paleobiology
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 (Payne, J)

GES 130. Soil Physics and Hydrology
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
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, Aut (Maher, K)

GES 170. Environmental Geochemistry
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: 80. GER:DB-NatSci

3 units, Aut (Bird, D)

GES 172. Nontraditional Stable Isotope Geochemistry
(Same as GES 272.) Elements other than C, N, O, S, and H that exhibit mass-dependent and non mass-dependent isotopic fractionation; examples include Mg, Ca, Si, Fe, Cr, Mo, Cu, Zn, and Hg. These systems represent a new frontier in isotope geochemistry and Earth Sciences as new tools for understanding geochemical, environmental and biological cycles. The theoretical calculations that form the basis for predicting fractionation, as well as the current state and applications of non-traditional isotope systems.

3 units, alternate years, not given this year

GES 173. Isotope Geochemistry Seminar
(Same as GES 273.) Current topics including new analytical techniques, advances in isotopic measurements, and new isotopic approaches and systems.
1-3 units, Win (Maher, K)

GES 179. Silicic Volcanism: Processes, Products, and Related Volcaniclastic Sequences
For students whose research involves products of silicic magmatism, mapping in volcanic terrains, or those interested in working with tephra or volcaniclastic units within their field areas. Topics include crustal magmatism and volcaniclastic sediments, including generation of large-scale silicic magma chambers, dynamics of eruption, emplacement and physical characteristics of pyroclastic flows and lavas, and interpreting volcaniclastic deposits.
1 unit, not given this year

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. May be taken for 3 units without lab. 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, 80 or equivalent.
2 units, alternate years, not given this year

GES 183. California Desert Geology
Field seminar. For upper division undergraduates and graduate students in the earth sciences and archaeology. 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. May be repeated for credit.
1 unit, not given this year

GES 185. Volcanology
For juniors, seniors, and beginning graduate students in Earth Sciences and Archaeology. How volcanic landforms and deposits relate to the composition and physical properties of magmas and the modes of emplacement. Labs emphasize recognizing types of lavas and products of explosive eruptions. Volcanic hazards and the effects of eruptions on climate and the atmosphere; volcanic-hosted geothermal systems and mineral resources. Required four-day field trip over Memorial Day weekend to study silicic and mafic volcanism associated with the western margin of the Basin and Range province. Prerequisite: 1, 102 or equivalent. GER:DB-NatSci
3-4 units, Spr (Mahood, G), alternate years, not given next year

GES 186. Geoarchaeology
(Same as GES 286.) 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 materials) 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
(Same as GES 299.) 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. See "Undergraduate Honors Program" above. 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 200. Professional Development in Geoscience Education
(Same as EESS 200, GEOPHYS 203.) May be repeated for credit.
1 unit, Aut (Payne, J), Spr (Payne, J)

GES 201. Science and Engineering Course Design
(Same as CTL 312, 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)

GES 207. Journey to the Center of the Earth
(Same as GES 107, GEOPHYS 107, GEOPHYS 207.) 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, Win (Lawrence, J; Mao, W)

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, Aut (Miller, E)

GES 211. Topics in Regional Geology and Tectonics
May be repeated for credit.

2-3 units, alternate years, not given this year

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, Aut (Lowe, D)

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, not given this year

GES 215A. Structural Geology and Rock Mechanics
(Same as CEE 297G.) 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.) 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 (Pollard, D)

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, given next year

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 218. Communicating Science
For undergraduates and graduate students interested in teaching science in local schools. Inquiry-based science teaching methods. How to communicate scientific knowledge and improve presentations. Six weeks of supervised teaching in a local school classroom. Prerequisite: course in introductory biology, geology, chemistry, or marine sciences.

3 units, Aut (Saltzman, J)

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 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, 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, not given this year

GES 224. Modeling Environmental Transformations
Quantitative overview of chemical and physical transport and transformation processes that govern elemental and contaminant concentrations in solids, fluids, and gases. Topics include the kinetics of mass transfer across environmental interfaces, formulation of reactor models, and elementary transport phenomena. Emphasis is on reactive transport modeling of fluid-mineral, isotopic, and microbial processes in the context of water-rock systems. Quantitative techniques for conceptualizing environmental processes from simple finite difference approaches to more sophisticated numerical reactive transport models.

3 units, alternate years, not given this year

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, Win (Journel, A)

GES 246. Reservoir Characterization and Flow Modeling with Outcrop Data
(Same as 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)

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, Win (Moldowan, J)

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 184.
3 units, Spr (Graham, S)

GES 254. Carbonate Sedimentology
Processes of precipitation and sedimentation of carbonate minerals with emphasis on marine systems. 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, 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, Win (Magoon, L; Peters, K)

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, Spr (Lowe, D)

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. Recommended: 249.
2-3 units, Spr (Moldowan, J)

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, Aut (Maher, 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, alternate years, not given this year

GES 272. Nontraditional Stable Isotope Geochemistry
(Same as GES 172.) Elements other than C, N, O, S, and H that exhibit mass-dependent and non mass-dependent isotopic fractionation; examples include Mg, Ca, Si, Fe, Cr, Mo, Cu, Zn, and Hg. These systems represent a new frontier in isotope geochemistry and Earth Sciences as new tools for understanding geochemical, environmental and biological cycles. The theoretical calculations that form the basis for predicting fractionation, as well as the current state and applications of non-traditional isotope systems.

3 units, alternate years, not given this year

GES 273. Isotope Geochemistry Seminar
(Same as GES 173.) 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, Aut (Payne, J)

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, Win (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, postcaldera 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, 102 or equivalent.

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 286. Geoarchaeology
(Same as GES 186.) 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 materials) and methods used in sourcing; estimating age based on stratigraphic and radiometric techniques. Weekly lab; weekend field trip to local archaeological/geological site.

5 units, 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, Aut (Hillev, G; Payne, J), Win (Hilley, G; Payne, J), Spr (Hilley, G; Payne, J)

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
(Same as GES 190.) 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 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

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 314. Structural Geology and Geomechanics
Research seminar. May be repeated for credit.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

GES 315. Literature of Structural Geology
Classic studies and current journal articles. May be repeated for credit.

1 unit, Aut (Pollard, D), Win (Pollard, D), Spr (Pollard, D)

GES 325. The Evolution of Body Size
(Same as BIO 325.) The influence of organism size on evolutionary and ecological patterns and processes. Focus is on integration of theoretical principles, observations of living organisms, and data from the fossil record. What are the physiological and ecological correlates of body size? Is there an optimum size? Do organisms tend to evolve to larger size? Does productivity control the size distribution of consumers? Does size affect the likelihood of extinction

or speciation? How does size scale from the genome to the phenotype? How is metabolic rate involved in evolution of body size? What is the influence of geographic area on maximum body size?
2 units, not given this year

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 333. Water Policy Colloquium
(Same as CEE 333, IPER 333.) Student-organized interdisciplinary colloquium. Creation, implementation, and analysis of policy affecting the use and management of water resources. Weekly speakers from academia and local, state, national, and international agencies and organizations.
1 unit, Spr (Freyberg, D)

GES 355. Advanced Stratigraphy Seminar and Field Course
Student-led presentations; poster-sized display on assigned topic; field trip.
1-3 units, not given this year

GES 381. Igneous Petrology and Petrogenesis Seminar
Topics vary by quarter. May be repeated for credit.
1-2 units, Win (Mahood, G)

GES 384. Volcanology Seminar
Specialized and advanced topics vary by offering. May be repeated for credit.
1-2 units, Aut (Mahood, G)

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.
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)

GEOPHYSICS (GEOPHYS) COURSES

For information on undergraduate and graduate programs in the Department of Geophysics, see the "Geophysics" section of this bulletin.

UNDERGRADUATE COURSES IN GEOPHYSICS

GEOPHYS 20Q. Predicting Volcanic Eruptions
Stanford Introductory Seminar. Preference to sophomores. The physics and chemistry of volcanic processes and modern methods of volcano monitoring. Volcanoes as manifestations of the Earth's internal energy and hazards to society. How earth scientists better forecast eruptive activity by monitoring seismic activity, bulging of the ground surface, and the discharge of volcanic gases, and by studying deposits from past eruptions. Focus is on the interface between scientists and policy makers and the challenges of decision making with incomplete information. Field trip to Mt. St. Helens, site of the 1980 eruption.
3 units, Spr (Segall, P), alternate years, not given next year

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
(Same as EE 60N.) Stanford Introductory Seminar. Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. GER:DB-EngrAppSci
4 units, Aut (Zebker, H)

GEOPHYS 100. Directed Reading
1-2 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 101. Research Preparation
Structured mentoring of students enrolled in Geophysics Summer Research Program. Development of research proposals and preliminary readings. May be repeated for credit.
1 unit, Spr (Klemperer, S; Egger, A)

GEOPHYS 101B. Research Presentation
Student participants from the Geophysics Summer Research Program prepare oral and poster presentations, culminating in formal presentations to the department and community.
1 unit, not given this year

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 107. Journey to the Center of the Earth
(Same as GES 107, GES 207, GEOPHYS 207.) 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, Win (Lawrence, J; Mao, W)

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; Arogunmati, A)

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, Spr (Beroza, G; Segall, P)

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 150. General Geophysics and Physics of the Earth
Elementary study of gravitational, magnetic, seismic, and thermal properties of the Earth. Earth's crust, mantle, core. Plate tectonics and mantle convection. Probing Earth structure with seismic waves. Measurements, interpretation, and applications to Earth structure and exploration. Prerequisites: calculus, first-year college physics. GER:DB-NatSci

3 units, Win (Klemperer, S; Sleep, N)

GEOPHYS 160. Waves
Topics: derivations of wave equations and their solutions in 1-D, 2-D, and 3-D; amplitude, polarization, phase and group velocities, attenuation, and dispersion; reflection and transmission at single and multiple interfaces; ray theory. Applications from acoustics, elastodynamics, and electromagnetics. Prerequisites: differential/integral calculus and complex functions. GER:DB-NatSci

3 units, not given this year

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
(Formerly 220.) 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, sea-floor spreading, subduction zones, and collisions. Case studies.

3 units, not given this year

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 (Klemperer, S)

GEOPHYS 180. 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. GER:DB-Math

3 units, Aut (Beroza, G; Segall, P), alternate years, not given next year

GEOPHYS 185A. Reflection Seismology
(Same as GEOPHYS 385A.) Research in reflection seismology and petroleum prospecting. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Biondi, B; Clapp, R), Win (Biondi, B; Clapp, R), Spr (Biondi, B; Clapp, R), Sum (Staff)

GEOPHYS 185B. Environmental Geophysics
(Same as GEOPHYS 385B.) Research on the use of geophysical methods for near-surface environmental problems. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Knight, R), Win (Knight, R), Spr (Knight, R), Sum (Staff)

GEOPHYS 185E. Tectonics
(Same as GEOPHYS 385E.) 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. WIM at 3-unit level.

1-3 units, Aut (Klemperer, S; Sleep, N; Thompson, G), Win (Klemperer, S; Sleep, N; Thompson, G), Spr (Klemperer, S; Sleep, N; Thompson, G), Sum (Staff)

GEOPHYS 185J. Global Seismic Techniques, Theory, and Application
(Same as GEOPHYS 385J.) 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.

1-3 units, Aut (Lawrence, J), Win (Lawrence, J), Spr (Lawrence, J), Sum (Lawrence, J)

GEOPHYS 185K. Crustal Mechanics
(Same as GEOPHYS 385K.) 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. WIM at 3-unit level.

1-3 units, Aut (Zoback, M), Win (Zoback, M), Spr (Zoback, M)

GEOPHYS 185L. Earthquake Seismology, Deformation, and Stress
(Same as GEOPHYS 385L.) Research on seismic source processes, crustal stress, and deformation associated with faulting and volcanism. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Zoback, M; Segall, P; Beroza, G), Win (Beroza, G; Segall, P; Zoback, M), Spr (Segall, P; Beroza, G; Zoback, M)

GEOPHYS 185S. Wave Physics
(Same as GEOPHYS 385S.) 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. WIM at 3-unit level.

1-3 units, Aut (Harris, J), Win (Harris, J), Spr (Harris, J)

GEOPHYS 185V. Poroelasticity
(Same as GEOPHYS 385V.) 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. WIM at 3-unit level.

1-3 units, Aut (Mavko, G), Win (Mavko, G), Spr (Mavko, G)

GEOPHYS 185Z. Radio Remote Sensing
(Same as GEOPHYS 385Z.) Research applications, especially crustal deformation measurements. Recent instrumentation and system advancements. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Zebker, H), Win (Zebker, H), Spr (Zebker, H)

GEOPHYS 190. Introduction to Geophysical Field Methods
Applications of geophysical methods for imaging and characterizing the top 500 meters of the Earth. Field-based equipment demonstrations and data acquisition practices; underlying theories; and modeling and interpreting the data. Techniques include electrical resistivity, ground penetrating radar, gravity, magnetics, electromagnetic and seismic methods focusing on applications in hydrology, engineering, and archaeology. GER:DB-EngrAppSci

3 units, Spr (Crook, N)

GRADUATE COURSES IN GEOPHYSICS

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GEOPHYS 200. Fluids and Flow in the Earth: Computational Methods
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 (Staff)

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 203. Professional Development in Geoscience Education
(Same as EESS 200, GES 200.) May be repeated for credit.

1 unit, Aut (Payne, J), Spr (Payne, J)

GEOPHYS 205. 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 207. Journey to the Center of the Earth
(Same as GES 107, GES 207, GEOPHYS 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, Win (Lawrence, J; Mao, W)

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; Cardoso, C)

GEOPHYS 211. Environmental Soundings Image Estimation
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, Win (Claerbout, J; Ayeni, G)

GEOPHYS 222. Reflection Seismology
(Formerly 182.) The principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration.

3 units, alternate years, not given next year

GEOPHYS 223. Reflection Seismology Interpretation
(Formerly 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. 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.

3 units, alternate years, not given this year

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, Win (Harris, J)

GEOPHYS 241A. Practice of Geostatistics and Seismic Data Integration
(Same as ENERGY 241.) Students build a synthetic 3D fluvial channel reservoir model with layer depths, channel geometry, and facies-specific petrophysic and seismic properties, stressing the physical significance of geophysical data. Reference data set is sparsely sampled, providing the sample data typically available for an actual reservoir assessment. Geostatistical reservoir modeling uses well and seismic data, with results checked against the reference database. Software provided (GSLIB and SRBtools). Prerequisite: ENERGY 240. Recommended: experience with Unix, MATLAB/C++/Fortran programming.

3-4 units, Spr (Mukerji, T; Caers, J)

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, Spr (Clapp, R; Harris, J)

GEOPHYS 260. Rock Physics for Reservoir Characterization
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.

3 units, Win (Dvorkin, J)

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: polarimetry and target discrimination, topographic mapping surface displacements, velocities of ice fields.

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, not given this year

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, Spr (Biondi, B)

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, Win (Beroza, G)

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, Win (Segall, P), alternate years, not given next year

GEOPHYS 290. Tectonophysics
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 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

GEOPHYS 385A. Reflection Seismology
(Same as GEOPHYS 185A.) Research in reflection seismology and petroleum prospecting. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Biondi, B; Clapp, R), Win (Biondi, B; Clapp, R), Spr (Biondi, B; Clapp, R), Sum (Staff)

GEOPHYS 385B. Environmental Geophysics
(Same as GEOPHYS 185B.) Research on the use of geophysical methods for near-surface environmental problems. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Knight, R), Win (Knight, R), Spr (Knight, R), Sum (Staff)

GEOPHYS 385E. Tectonics
(Same as GEOPHYS 185E.) 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. WIM at 3-unit level.

1-3 units, Aut (Klemperer, S; Sleep, N; Thompson, G), Win (Klemperer, S; Sleep, N; Thompson, G), Spr (Klemperer, S; Sleep, N; Thompson, G), Sum (Staff)

GEOPHYS 385J. Global Seismic Techniques, Theory, and Application
(Same as GEOPHYS 185J.) 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.

1-3 units, Aut (Lawrence, J), Win (Lawrence, J), Spr (Lawrence, J), Sum (Lawrence, J)

GEOPHYS 385K. Crustal Mechanics
(Same as GEOPHYS 185K.) 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. WIM at 3-unit level.

1-3 units, Aut (Zoback, M), Win (Zoback, M), Spr (Zoback, M)

GEOPHYS 385L. Earthquake Seismology, Deformation, and Stress
(Same as GEOPHYS 185L.) Research on seismic source processes, crustal stress, and deformation associated with faulting and volcanism. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Zoback, M; Segall, P; Beroza, G), Win (Beroza, G; Segall, P; Zoback, M), Spr (Segall, P; Beroza, G; Zoback, M)

GEOPHYS 385S. Wave Physics
(Same as GEOPHYS 185S.) 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. WIM at 3-unit level.

1-3 units, Aut (Harris, J), Win (Harris, J), Spr (Harris, J)

GEOPHYS 385V. Poroelasticity
(Same as GEOPHYS 185V.) 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. WIM at 3-unit level.

1-3 units, Aut (Mavko, G), Win (Mavko, G), Spr (Mavko, G)

GEOPHYS 385Z. Radio Remote Sensing
(Same as GEOPHYS 185Z.) Research applications, especially crustal deformation measurements. Recent instrumentation and system advancements. May be repeated for credit. WIM at 3-unit level.

1-3 units, Aut (Zebker, H), Win (Zebker, H), Spr (Zebker, H)

GEOPHYS 399. Teaching Experience in Geophysics
On-the-job training in the teaching of geophysics. An opportunity to develop problem sets and lab exercises, grade papers, and give occasional lectures under the supervision of the regular instructor of a geophysics course. Regular conferences with instructor and with students in the class provide the student teacher with feedback about effectiveness in teaching.

2-4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GEOPHYS 400. Research in Geophysics

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GERMAN GENERAL (GERGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of German. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in German, see the "German" section of this bulletin. For courses in German language instruction, see "German Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN GERMAN GENERAL

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, Win (Robinson, O)

GERGEN 61Q. Culture and Conflict in Contemporary Europe
(S,Sem Same as COMPLIT 61Q.) Stanford Introductory Seminar. Preference to sophomores. Transformation of European culture and identity in the wake of the Cold War, European unification, and the post 9/11 environment. Pressures on transatlantic relationships; anti-Americanism; tensions around national cultural identity due to regional integration and globalization; immigration and the European experience of multiculturalism; and flashpoints of conflict concerning religion, secularization, and antisemitism.
3-5 units, Spr (Berman, R)

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, Win (Daub, A)

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 144. Germanic Theologies
(Same as GERGEN 244.) Thinkers from Martin Luther to Martin Buber who have transformed western notions about God. Contributions from philosophers, poets, and theologians on the role of the Bible, the meaning of revelation, and the status of human beings in the Universe. Readings from Luther, Hamann, Schleiermacher, Nietzsche, Kafka, and Rosenzweig. GER:DB-Hum
3-5 units, Aut (Pourciau, S)

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, Spr (Daub, A)

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 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 Bever. Recommended: German.
3-5 units, not given this year

GERGEN 181. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

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 191A. Oedipus, Hamlet, Moses: Archetypes of the Hero
(Same as GERGEN 291A.) 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; theoretical and critical essays by Laplanche, Lyotard, Lacan, de Certeau, Kofman, Assmann, Said, and Cavell. GER:DB-Hum
3-5 units, not given this year

GERGEN 205. Technologies of the Self
(Same as GERGEN 305.) 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
(Same as GERGEN 312.) 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 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 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 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, Win (Daub, A)

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, Aut (Dornbach, M)

GERGEN 244. Germanic Theologies
(Same as GERGEN 144.) Thinkers from Martin Luther to Martin Buber who have transformed western notions about God. Contributions from philosophers, poets, and theologians on the role of the Bible, the meaning of revelation, and the status of human beings in the Universe. Readings from Luther, Hamann, Schleiermacher, Nietzsche, Kafka, and Rosenzweig.

3-5 units, Aut (Pourciau, S)

GERGEN 246. Being at Home in the World: Kant's Critique of the Power of Judgment
(Same as GERGEN 346.) Is the world suited for human purposes? How Kant's answer broached issues that would prove central to modernity: how aesthetic enjoyment relates to morality and scientific rationality; analogies between art and nature; delight taken in beauty and the pleasurable pain of sublimity; creative genius and common sense; affinities between the reflective understanding of biological life and the enhancement of mental life through reflection on beautiful forms. Later theorists' critical responses.

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, Spr (Daub, A)

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
(Same as GERGEN 191A.) 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; theoretical and critical essays by Laplanche, Lyotard, Lacan, de Certeau, Kofman, Assmann, Said, and Cavell.

3-5 units, not given this year

GERGEN 305. Technologies of the Self
(Same as GERGEN 205.) 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.

3-5 units, not given this year

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 312. The Invention of Experience
(Same as GERGEN 212.) 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.

3-5 units, Spr (Dornbach, M)

GERGEN 346. Being at Home in the World: Kant's Critique of the Power of Judgment
(Same as GERGEN 246.) Is the world suited for human purposes? How Kant's answer broached issues that would prove central to modernity: how aesthetic enjoyment relates to morality and scientific rationality; analogies between art and nature; delight taken in beauty and the pleasurable pain of sublimity; creative genius and common sense; affinities between the reflective understanding of biological life and the enhancement of mental life through reflection on beautiful forms. Later theorists' critical responses.

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

OVERSEAS STUDIES COURSES IN GERMAN GENERAL

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN GERMAN GENERAL COURSES

OSPBER 174. Sports, Culture, and Gender in Comparative Perspective

5 units, Spr (Junghanns, W)

OSPBER 177A. Culture and Politics in Modern Germany

4-5 units, Aut (Kramer, K)

GERMAN LANGUAGE (GERLANG) COURSES

Students registering for the first time in a first- or second-year course must take a placement test if they had any training in German before entering Stanford. All entering students must take Part I (written) of the placement test online during the summer, followed by Part II (oral), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN GERMAN LANGUAGE

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 (Nissler, P), Win (Strachota, K), Spr (Gruen, I)

GERLANG 2. First-Year German, Second 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 (Nissler, P), Win (Nissler, P), Spr (Strachota, K)

GERLANG 3. First-Year German, Third 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 (Gruen, I), Win (Nissler, P), Spr (Nissler, P)

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 (Petig, W)

GERLANG 5B. Intensive First-Year German, Part B
Equivalent of 1,2,3 combined. Stanford graduate students restricted to 9 units register for 205A,B.
5 units, Sum (McQueen, K)

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 (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20B. Intermediate German Conversation (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20C. Advanced German Conversation (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20E. Fun Facts about Europe (AU)
1 unit, Win (McQueen, K)

GERLANG 20K. Küche Mitt (German Cooking Class) (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20M. Mitt Movie Series (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20P. Theme Projects (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

GERLANG 20T. Teaching German Conversation (AU)
1 unit, Aut (McQueen, K), Win (McQueen, K), Spr (McQueen, K)

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 of GERLANG 4; 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. For students planning to do a business internship in a German-speaking country. Prerequisite: 3.
4 units, Aut (Petig, W)

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, alternate years, not given this year

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, Spr (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, Aut (Tsui, C)

GERLANG 102. Advanced Language Study II
Continuation of 101.
3-4 units, Spr (Lee, S)

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, 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

For graduate students only.

GERLANG 205A. Intensive First-Year German
Equivalent of 1,2,3 combined. Stanford graduate students restricted to 9 units may take both courses 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)

OVERSEAS STUDIES COURSES IN GERMAN LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN GERMAN LANGUAGE COURSES

OSPBER 1Z. Accelerated German: First and Second Quarters
8 units, Aut, Win (Splettstoesser, J; Wohlfeil, J)

OSPBER 2Z. Accelerated German, Second and Third Quarters
8 units, Spr (Wohlfeil, J)

OSPBER 21B. Intermediate German
5 units, Aut (Friesel, D), Win (Friesel, D), Spr (Friesel, D)

OSPBER 100B. Aktives Deutsch
2 units, Aut (Friesel, D), Win (Friesel, D), Spr (Strube, F)

OSPBER 101B. Advanced German
5 units, Aut (Biege, M), Win (Biege, M), Spr (Biege, M)

GERMAN LITERATURE (GERLIT) COURSES

These courses typically require knowledge of German. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in German, see the "German" section of this bulletin. For courses in German language instruction, see "German Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN GERMAN LITERATURE

GERLIT 16N. Music, Myth, and Modernity: Wagner's Ring Cycle and Tolkien's Lord of the Rings
(F,Sem Same as MUSIC 16N.) Stanford Introductory Seminar. Preference to freshmen. Roots of Wagner's operatic cycle and Tolkien's epic trilogy in a common core of Norse, Germanic, and Anglo-Saxon mythology. The role of musical motive and characterization in Wagner's music dramas and the film version of Tolkien's trilogy. Music as a key element in the psychological, political, and cultural revision of ancient myth in modern opera and film. GER:DB-Hum, EC-GlobalCom
3 units, Spr (Grey, T)

GERLIT 121. Hannah Arendt
One of the most important political thinkers on the epochal events in the 20th century. Her central concepts and ideas such as her notion of totalitarianism and its origins, the banality of evil, the life of the mind, and the idea of revolution. Her reflections on art, literature, and history. GER:DB-Hum
3-5 units, Win (Engel, A)

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, WIM
4 units, Win (Daub, A)

GERLIT 127A. German Sports Movies
How sports movies represent changing body cultures and conceptions of sports and media, and allow a glimpse into the life of German societies and history since the 20s. Sports include alpinism, boxing, cycling, football (soccer), gymnastics, track and field, and volleyball. Movies in German.
3 units, Aut (Junghanns, W)

GERLIT 130A. Pop Literature in the Federal Republic of Germany
Peter Handke's protest against Gruppe 47's defining power; Rolf Dieter. Brinkmann's connection with Leslie Fiedler (acceptance of mass culture) and the aesthetic orientation of the beat generation. The establishment of a counter-counterculture in the 80s, pop music as a German version of new journalism, the narrative tradition in the wake of Raymond Chandler, the impact of disk jockey culture in the 90s, and the cataloging and archiving of media and youth culture. GER:DB-Hum
4 units, Spr (Staff)

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, Win (Shamel, M)

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, Aut (Shamel, M)

GERLIT 131B. German Lyric and the Oriental Tradition
How the translation of Oriental poetry and poetics into German in the late 18th and early 29th centuries inspired poetry incorporating Oriental models by writers such as Goethe, Rückert, Platen, and Heine. German translations of Oriental poets and writers. Poetry as a transcultural and crosstemporal phenomenon.The lyric's relationship to music in the context of Germany and the Orient. GER:DB-Hum
3-5 units, Spr (Shamel, M)

GERLIT 132. German Sports Culture
Peculiarities of sports in Germany as a point of access to past and present German culture. Concepts of competition and performance; relations between sports and politics in different periods of modern German history. Sources include theoretical and literary texts in English and German, and media representations of athletic contests. GER:DB-Hum
5 units, Aut (Junghanns, W)

GERLIT 133C. German Romanticism
(Same as GERLIT 233.) The literary and theoretical innovations of early Romanticism, and works from the later phase. In German. GER:DB-Hum
3-5 units, not given this year

GERLIT 133F. German Self-Understandings: Between Culture and Civilization
(Same as GERLIT 233F.) German-language writers' attempts to come to terms with German culture from 1800. Visions of a national *Kultur* in opposition to the universalistic civilization of modernity; the role of language and the arts in this ideal; the emergence of militant nationalism and attempts to counter this tendency with enlightened patriotism; and the quandaries of postwar and post-1989 German self-understanding. GER:DB-Hum
3-5 units, not given this year

GERLIT 135. Literature and the Limits of Self-Determination: Introduction to 19th-Century German Prose
Works registering a heightened sense of the precarious position of the modern individual including Goethe, Kleist, Buechner, Nietzsche, Freud, Mann, and Kafka. In German; attention to improvement of linguistic skills. WIM GER:DB-Hum
4 units, not given this year

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, Aut (Daub, A)

GERLIT 137. Introduction to German Poetry
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, WIM
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, Win (Robinson, O)

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 140. Postcolonialism and German Literature
Goal is to re-read texts without the constraints of political correctness. Colonial and gender discourse, ambivalence towards foreigners from outside Europe: between desire and fear (Heinrich von Kleist, Theodore Storm, Theodore Fontane); colonialism as a system of repression (Franz Kafka); the third world and the literary left (Peter Weiss, Heiner Müller); drawing parallels between colonial history and National Socialism (Sebald); post-Communist migration discourse (Hans Magnus Enzensberger) and German-Turkish literature (Feridun Zaimoglu). GER:DB-Hum
4 units, Spr (Staff)

GERLIT 147. The Avant Garde
(Same as GERLIT 247.) What happens to art in an age of movies, machines, and two world wars? Who is still making it, and why? What does the avant garde actually mean, and to whom? What are the techniques that distinguish it, in the minds of its most revolutionary practitioners, from all that came before? And why should people care about these techniques today? German materials explored in a wider European context, with emphasis on the avant garde movements of France and Russia. GER:DB-Hum
3-5 units, Win (Pourciau, S)

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 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 195. The Culture of Reason and its Discontents: Introduction to Modern German Intellectual History
(Same as GERLIT 295.) Characteristics of modernity such as rational self-legislation, growing separation of spheres of life, and liberating and disorienting loss of traditional frameworks of meaning. Texts include Kant, Schiller, Marx, Nietzsche, Weber, Adorno, and Horkheimer. Discussion and written work in English. Students may read texts in translation; assistance provided to those reading in German. GER:DB-Hum
4 units, not given this year

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 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

GRADUATE COURSES IN GERMAN LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

GERLIT 158. German Dialects
(Same as GERLIT 258.) 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, not given this year

GERLIT 215. Gottfried Benn and Francis Ponge: Mid-20th-Century European Poetry and the Problem of the Referent
(Same as COMPLIT 215A, FRENGEN 215.) Comparative readings of the two poets in their respective national contexts, with attention to biographical and poetological frameworks. Canonic status and scholarly reception histories. Renewed interest in their work with

regard to their distinctive practices of connecting prosodic form and extra textual referents. Prerequisite: reading knowledge of German or French.

3-5 units, Aut (Gumbrecht, H)

GERLIT 233. German Romanticism
(Same as GERLIT 133C.) The literary and theoretical innovations of early Romanticism, and works from the later phase. In German.

3-5 units, not given this year

GERLIT 233F. German Self-Understandings: Between Culture and Civilization
(Same as GERLIT 133F.) German-language writers' attempts to come to terms with German culture from 1800. Visions of a national *Kultur* in opposition to the universalistic civilization of modernity; the role of language and the arts in this ideal; the emergence of militant nationalism and attempts to counter this tendency with enlightened patriotism; and the quandaries of postwar and post-1989 German self-understanding.

3-5 units, not given this year

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, Spr (Eshel, A; White, H)

GERLIT 247. The Avant Garde
(Same as GERLIT 147.) What happens to art in an age of movies, machines, and two world wars? Who is still making it, and why? What does the avant garde actually mean, and to whom? What are the techniques that distinguish it, in the minds of its most revolutionary practitioners, from all that came before? And why should people care about these techniques today? German materials explored in a wider European context, with emphasis on the avant garde movements of France and Russia.

3-5 units, Win (Pourciau, S)

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, Win (Dornbach, M)

GERLIT 250C. Postwar German Culture and Thought: 1945 to the Present
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, Win (Robinson, O)

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
(Same as GERLIT 158.) 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, not given this year

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 295. The Culture of Reason and its Discontents: Introduction to Modern German Intellectual History
(Same as GERLIT 195.) Characteristics of modernity such as rational self-legislation, growing separation of spheres of life, and liberating and disorienting loss of traditional frameworks of meaning. Texts include Kant, Schiller, Marx, Nietzsche, Weber, Adorno, and Horkheimer. Discussion and written work in English. Students may read texts in translation; assistance provided to those reading 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 philosophical 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 310. Theorizing Experience
The theoretical relevance of the category of experience (*Erfahring*). Key articulations including Hegel, Benjamin, Gadamer, and more recent authors. Topics such as: negativity in experience; the tension between internal and external standpoints; contrast between lived and interiorized experience; the character of aesthetic experience and its power to confront audiences with, or compensate them for, the experiential poverty brought on by modernity. In English.
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)

OVERSEAS STUDIES COURSES IN GERMAN LITERATURE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN GERMAN LITERATURE COURSES

OSPBER 53. The Brothers Grimm and their Fairy Tales
4 units, Spr (Robinson, O)

OSPBER 101A. Contemporary Theater
5 units, Spr (Kramer, K)

GRADUATE SCHOOL OF BUSINESS (GSBGEN) COURSES

Only Stanford Introductory Seminars open to undergraduates are listed. See http://www.gsb.stanford.edu/ for additional information on the Graduate School of Business.

UNDERGRADUATE COURSES IN GRADUATE SCHOOL OF BUSINESS

GSBGEN 111Q. Seminar in Entrepreneurial Communication
Stanford Introductory Seminar. College campuses have been the incubators for thousands of new business ventures. What makes the difference between a successful entrepreneur and an initial failure: often not the quality of the idea, but rather the ability of the entrepreneurs to successfully communicate their vision to potential investors, employees, and customers. Successful and failed entrepreneurial communication. Basics of persuasive oral and written communication.
3 units, Spr (Schramm, J)

HEALTH RESEARCH AND POLICY (HRP) COURSES

For information on graduate programs in Health Research and Policy, see the "Health Research and Policy" section of this bulletin. Course and laboratory instruction in the Department of Health Research and Policy conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN HEALTH RESEARCH AND POLICY

HRP 89Q. Introduction to Crosscultural Issues in Medicine
Stanford Introductory Seminar. Preference to sophomores. Crosscultural issues that impact health care delivery such as ethnicity, immigration, language barriers, and service expectations. Focus is on culturally unique and non-English speaking populations and developing interpersonal and communication skills with diverse ethnic groups. 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 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, Aut (Greely, H)

HRP 210. Health Law and Policy I
Open to Law and medical students and undergraduates by consent of instructor. Introduction to the American health care system; its legal and policy problems. Topics: special characteristics of medical care compared to other goods and services, the difficulties of assuring quality care, the complex patchwork of the financing system, and the ethical problems the system raises.
3 units, alternate years, not given this year

HRP 211. Law and the Biosciences
(Same as LAW 368) Open to law and medical students; other graduate students by consent of instructor. 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. (Semester schedule.)
3 units, Win (Greely, H)

HRP 212. Crosscultural Medicine
Interviewing and behavioral skills needed to facilitate culturally relevant health care across all population groups. Explicit and implicit cultural influences operating in formal and informal medical contexts.

3 units, Spr (Corso, I)

HRP 213. Research Protocol Development for Clinical and Translational Research
Primarily for medical students in the Clinical Research Scholarly concentration; open to graduate students except Epidemiology graduate students. Development of research questions and plans for statistical analysis. Study design, sample size and power calculations, and statistical analysis of study data. Analytic methods to carry out statistical power and sample size calculations. Prerequisites: 225, and 258 or 259, or consent of instructor.

2-3 units, not given this year

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, Aut (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 259, or consent of instructor.

2-3 units, not given this year

HRP 220. Health Law and Policy II
(Same as LAW 314) Open to law and medical students; other graduate students by consent of instructor. Continuing survey of the American health care system; its legal and policy problems. Topics include end of life, reproductive rights, research ethics, the food and drug administration, and public health law. Prerequisite: Health Law and Policy I recommended.

3-4 units, not given this year

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. (Balise)

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: 159/259 or equivalent, 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 epidemiologic studies. Prerequisite: 225 or consent of instructor. (Nelson)

3-4 units, Win (Nelson, L)

HRP 228. Genetic and Molecular Epidemiology
Design, analysis, and interpretation of studies of genetic risk factors for common diseases in human populations. Topics: heritability, detecting disease genes using family and population-based study designs, gene-environment interactions, pharmacogenetics, and genomics. Prerequisite: 225 or consent of instructor.

2 units, Sum (Sieh, W)

HRP 229. Chronic Disease Epidemiology
Descriptive epidemiology and sources of incidence and mortality data; biological bases of neurological, musculoskeletal, cardiovascular, and other chronic diseases except cancer; methodological issues relevant to chronic epidemiologic research; causal inference; major environmental risk factors; genetic susceptibility; and examples of current research and critiques of literature. Prerequisite: 225 or consent of instructor.

2-3 units, Spr (Popat, R)

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), alternate years, not given next 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 (Friedman, G), Spr (West, D)

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, Win (Popat, R)

HRP 239. Understanding Statistical Models and their Social Science Applications
(Same as EDUC 260X, STATS 209.) Statistical modeling in experimental and non-experimental settings, including misconceptions in social science applications such as causal models. Text is Statistical Models: Theory and Practice, by David Freedman. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods including multiple regression, logistic regression, and log-linear models.

3 units, Win (Rogosa, D)

HRP 240. Rethinking International Health
(Same as MED 230.) Issues and players that shape international 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 leaders in international health.

2-3 units, Spr (Parsonnet, 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 re-analyses 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 (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 280. Spanish for Medical Students
(Same as SPANLANG 121M.) Goal is a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

3 units, Aut (Staff)

HRP 281. Spanish for Medical Students
(Same as SPANLANG 122M.) Goal is a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference 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 rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference 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 Spanish Conversation
Oral language skills covering pediatric, gynecological, and other specialty exams; patient health education and counseling; and diseases such as diabetes, asthma, and TB. Prerequisite: Spanish proficiency or consent of instructor.

3 units, Aut (Corso, I), Win (Corso, I), Spr (Corso, I)

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, Win (Zenios, S; Chess, R)

HRP 391. Political Economy of Health Care in the United States
(Same as MGTECON 331, PUBLPOL 231.) The economic tools and institutional and legal background to understand how markets for health care products and services work. Moral hazard and adverse selection. Institutional organization of the health care sector. Hospital and physician services markets, integrated delivery systems, managed care, pharmaceutical and medical device industries. Public policy issues in health care, medical ethics, regulation of managed care, patients' bill of rights, regulation of pharmaceuticals, Medicare reform, universal health insurance, and coverage of the uninsured. International perspectives, how other countries' health care systems evolved, and what the U.S. can learn from their experiences.

4 units, Spr (Kessler, D; Bundorf, M)

HRP 392. Analysis of Costs, Risks, and Benefits of Health Care
(Same as BIOMEDIN 432, MGTECON 332.) For graduate students. The principal evaluative techniques for health care, including utility assessment, cost-effectiveness analysis, cost-benefit analysis, and

decision analysis. Emphasis is on the practical application of these techniques. Group project presented at end of quarter. Guest lectures by experts from the medical school, pharmaceutical industry, health care plans, and government.

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)

HISTORY (HISTORY) COURSES

For information on undergraduate and graduate programs in the Department of History, see the "History" section of this bulletin.

HISTORY COURSE CATALOG NUMBERING SYSTEM

International Global, Thematic
Introductory Seminars: Freshmen, Sophomores: 95N
Lectures: 103E, 104,106A,B, 107
Colloquia: 201, 201A, 202, 205B, 206, 208B, 208S, 299X, 301, 304, 305, 305B, 306E, 307A, 308B, 309A, 337C, 399A
Research Seminars and Workshops: 209S, 401A,B

Ancient and Medieval Europe
Introductory Seminars: Freshmen, Sophomores: 12N
Sources and Methods Seminars: 16S
Lectures: 110A
Colloquia: 217A,B, 218A, 311F,G, 317A,B, 318A

Early Modern and Modern Europe
Introductory Seminars: Freshmen, Sophomores: 34N, 36N
Sources and Methods Seminars: 15S, 18S, 32S, 33S, 35S, 85S
Lectures: 110C, 132, 132A, 133B, 137, 137A, 138A,B, 140A
Colloquia: 225A, 227B, 230F, 232D, 233, 233B,G, 234A, 236A, 238K, 325A, 327B, 330, 330A, 331B, 332D, 332F, 333, 333B, 337
Research Seminars and Workshops: 430, 438

Eastern Europe, Russia, Eurasia
Introductory Seminars: Freshmen, Sophomores: 20Q, 22N
Sources and Methods Seminars: 21S
Lectures: 120A,B, 125
Colloquia: 221B, 223, 224B, 229, 321C, 322, 323, 323B, 324B,F, 329
Research Seminars and Workshops: 421A, 424C

History of Science
Introductory Seminars: Freshmen, Sophomores: 44N, 46N
Lectures: 140A
Colloquia: 242G, 243C, 243G, 243K, 332F, 343C, 343G

Africa
Introductory Seminars: Freshmen, Sophomores: 48Q
Sources and Methods Seminars: 48S
Lectures: 145B
Colloquia: 248S, 249, 345B, 346, 349
Research Seminars and Workshops: 448A,B

United States
Introductory Seminars: Freshmen, Sophomores: 36N, 38N, 52N, 54N
Sources and Methods Seminars: 56S, 57S
Lectures: 107, 150A,B,C, 151, 154, 163, 166
Colloquia: 201, 243K, 251G, 254, 255B,D, 256, 258, 260, 261, 265, 267E, 268E, 351A,C,E,F, 352B, 355D, 356, 358, 368E
Research Seminars and Workshops: 401A,B, 461A,B

Latin America
Lectures: 70, 170
Colloquia: 205B, 273B, 274A, 275F, 279A, 305B, 373B, 374A, 375F, 378A, 379A

Middle East
Introductory Seminars: Freshmen, Sophomores: xx
Sources and Methods Seminars: 49S
Lectures: 181B, 182
Colloquia: 281A,B, 282, 282A,B, 283, 287B, 381B, 382, 382 A,B, 387B

Jewish History
Sources and Methods Seminars: 85S
Lectures: 137
Colloquia: 287B, 337, 387B

Asia
Introductory Seminars: Freshmen, Sophomores: 90Q, 95N
Lectures: 193, 194B, 195, 196, 197, 198
Colloquia: 291D,E, 292, 293B,D, 294, 295F,J, 296, 296E, 390A, 391E, 392, 392F, 393A,B,D, 396E
Research Seminars and Workshops: 497A,B

UNDERGRADUATE COURSES IN HISTORY

HISTORY 12N. The Early Roman Emperors: HIstory, Biography, and Fiction
(F,Sem Same as CLASSHIS 37N.) Stanford Introductory Seminar. Preference to freshmen. The politics, drama, and characters of the period after the fall of the Roman Republic in 49 B.C.E. Issues of liberty and autocracy explored by Roman writers through history and biography. The nature of history writing, how expectations about literary genres shape the materials, the line between biography and fiction,and senatorial ideology of liberty. Readings include: Tacitus' *Annals*, Suetonius' *Lives of the Caesers*, and Robert Graves' *I Claudius* and episodes from the BBC series of the same title. GER:DB-Hum

3 units, Aut (Saller, R)

HISTORY 15S. Understanding Machiavelli: War, Women, and Politics
Focus is on the central works of Machiavelli including *The Discourses, The Prince, The Art of War,* and *The Mandragola*. Topics include: the rise of the Medici; the politics of Italian city states; the use of the classics in the Renaissance; humanism; the birth of the individual; Savonarola; torture in early modern Europe; gender and women in the writings of Machiavelli; and the Italian wars.

5 units, Aut (Bouley, B)

HISTORY 16S. Vikings, Crusaders, Kings: The Normans and the Expansion of Latin Christendom
Seafaring raiders became lords, princes, and crusaders during pivotal centuries in European history. Who were the Normans? How much did they retain a sense of their Viking roots? What kind of relationship did these warrior-aristocrats have with Christianity? How did the idea of Christendom develop through Western European encounters with the non-Latin peoples (Greeks, Muslims) of the Mediterranean? Sources include Beowulf, pro- and anti-Norman histories, Bayeux tapestry, Domesday book, crusading texts, saints' lives, and papal letters.

5 units, Spr (Miner, J)

HISTORY 18S. Mobility in France and the Self: People, Products, and Ideas in Motion
Development of the introspective self and the unity of the idea of France through transformations in movement. Early modern to contemporary. Topics include: the journeyman's tour de France; roads; war; the Enlightenment; early modern ocean transport; rural life; cartography; surrealist tourism; and protests. Texts and non-texts, including maps, posters, travel journals, statistics, and fictional works.

5 units, Spr (McDonough, K)

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, Spr (Kollmann, N)

HISTORY 21S. Nationalism and Communism in Eastern Europe, 1944-1953
E. European politics, cultures, and societies between WW II and the

death of Joseph Stalin. Topics: ethnic cleansing; retribution against Nazi collaborators; Communist seizures of power; the relationship between nationalism and communism; ways in which E. European societies were susceptible to communism; and whether it was inevitable that the region would form a Soviet-dominated, Communist bloc hostile to the West. Sources include photographs, newspapers, diplomatic records, memoirs, and film.

5 units, Win (Perez, D)

HISTORY 22N. Images and Practices of Violence in Early Modern Russian Art and Law

Stanford Introductory Seminar. Preference to freshmen. Myths and realities about violence in 15th-17th century Russia. While Muscovy is often considered a brutal and violent state, political ideology stressed piety, judicial practice routinely mitigated sentences, and artistic imagery never depicted graphic violence. Theories of iconography, ritual, and imagery and their reception by beholders; judicial and political practice; political ideology; social behavior; and comparisons to early modern Europe in art, violence, and the law. GER:DB-Hum

5 units, Spr (Kollmann, N)

HISTORY 32S. Discipline and Dirt: Urban Environments and Social Control in Modern Britain, 1800-1900

The disciplinary underbelly of liberal freedom in the modern world's first democracy. How is dirt a political problem, and what are its racial, sexual, and class dimensions? How do sewers, drains, and water closets function as disciplinary devices? How are urban environments rendered safe for democracy? How does power and social control operate in free societies? What are the connections among cultural practices, material environments, and political power? Focus is on Britain, with diversions into Europe and the Empire.

5 units, Win (Forth, A)

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, WIM

5 units, Win (Lougee Chappell, C)

HISTORY 34N. The European Witch Hunts

Stanford Introductory Seminar. Preference to freshmen. Witch trials, early modern demonology, and historians' interpretations. What was it about early modernity that fueled witch hunting? Forms of the supernatural in history, whether from the ordered world of organized religion, or frightening, uncontrolled, and dangerous. The idea of witchcraft; the fear that some people harm others supernaturally. Reformation era witch hunts conducted in a period of state building and scientific discovery and in violation of extant laws and procedures. GER:DB-Hum

4 units, Win (Stokes, L)

HISTORY 35S. The Specter of Female Power: Harpies, Harlots, and Hysterics in Revolutionary France, 1770-1871

How gender shaped French revolutionary events from the the Enlightenment to the Paris Commune. How feminine norms operated, and how real women fared, as salonnières, republican mothers, and Communard combatants. Sources include novels, cartoons, paintings, and memoirs. Cautionary tales about disordered feminity abounded, featuring harpies hungry for bread and blood, ennobled harlots plotting their next boudoir triumph, and religious hysterics conspiring against the Revolution.

5 units, Win (Summers, K)

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 38N. The Body

Stanford Introductory Seminar. Preference to freshmen. Cultural and social meanings of the body. How medicine, media, law, and culture construct changing ideals of the body. How to apply historical and feminist analyses to understand change and the difference that gender makes in the social and cultural construction of the body. Emphasis is on shifting historical ideals for female and male bodies, and the changing importance of body image in popular culture. Readings include girls' diaries, women's sports, masculinity in the media, sexual violence, and performing the body. GER:DB-Hum, EC-Gender

5 units, Spr (Freedman, E)

HISTORY 44N. The History of Women and Gender in Science, Medicine, and Engineering

Stanford Introductory Seminar. Preference to freshmen. Women's participation in science; women as objects of scientific research; gender in the culture of the sciences; and how gender analysis has changed science theory and practice. GER:DB-Hum, EC-Gender

4 units, Win (Schiebinger, L)

HISTORY 46N. Science and Magic

Stanford Introductory Seminar. Preference to freshmen. Key episodes in the intertwined histories of natural science and magic from the early modern period, and questions these episodes raise regarding the nature of scientific knowledge, its public image, and the modern role of magic in society. GER:DB-Hum

5 units, Win (Riskin, 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

3 units, Win (Samoff, J)

HISTORY 48S. South Africa for Whom?: Nationalisms in 20th-Century South Africa

How did nationalist movements shape 20th-century S. Africa, and how did these movements relate to and inform each other? What were the limits of these nationalist projects? S. Africa as a laboratory for the development of nationalistic ideologies in the 20th century, focusing on the most significant nationalist movements (African, Afrikaner, and Zulu).

5 units, Spr (Jarvis, L)

HISTORY 49S. Slavery, Race, and Society in Islamic Africa and the Middle East from the 7th to 20th Centuries

Questions involving slavery and community identity in the Middle East and sub-Saharan Africa. Why are there still reports of slavery in some Muslim majority countries? How does slavery and race overlap in Muslim societies? During the rapid expansion of Islam from the Arabian Peninsula to Asia, Africa, and parts of Europe, Islamic concepts of universal brotherhood united ethnic groups and social classes; but the Muslim world experienced slave revolts and ethnic conflicts.

5 units, Aut (Hill, M)

HISTORY 52N. The Harlem Renaissance

Stanford Introductory Seminar. Preference to freshmen. The literary and artistic movement of the Harlem Renaissance in the context of broader transformations in American and African American culture in the 20s. Novels, poetry, plays, and critical essays by writers such as Langston Hughes, Zora Neale Hurston, Nella Larsen, Claude McKay, Wallace Thurman, and Alain Locke. The work of contemporary musicians, dancers, and visual artists. GER:DB-Hum

5 units, Win (Campbell, J)

HISTORY 54N. African American Women's Lives

Stanford Introductory Seminar. Preference to freshmen. The everyday lives of African American women in 19th- and 20th-century America in comparative context of histories of European, Hispanic, Asian, and Native American women. Primary sources including personal journals, memoirs, music, literature, and film, and historical texts. Topics include slavery and emancipation, labor and

leisure, consumer culture, social activism, changing gender roles, and the politics of sexuality. GER:DB-Hum

4-5 units, Aut (Hobbs, A)

HISTORY 56S. Crime Waves and Panics in the U.S. from Reconstruction to the War on Terror

Crime waves, real or imagined, have sparked the popular imagination throughout American history, but particularly after the Civil War. How debates over crime have shaped the boundaries of the nation and defined who can or cannot be a legitimate member of the national community. Topics include lynching, labor radicalism, the red scare, and the current War on Terror. Sources include speeches, newspaper articles, pamphlets, congressional testimony, movies, and popular literature.

5 units, Aut (Ponomarenko, M)

HISTORY 57S. Reconstructions: Nation Building in U.S. Foreign Policy, 1865-2009

U.S. campaigns to reconstruct foreign nations during and after wars in the American South, the Philippines, Japan, and Iraq. Topics include: ideas that shaped American policies; the influence of military capabilities, race, economics, culture, and the international system; why some reconstructions worked and some did not; experiences of the occupier and the occupied; how Americans applied lessons from one reconstruction to others; the significance of historical interpretation of foreign policy debates.

5 units, Win (Wilkins, C)

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 65. Introduction to Comparative Studies in Race and Ethnicity

(Same as CSRE 196C, 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, given next year

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, Win (Staff)

HISTORY 85S. Jews, Christians and Muslims in a Mediterranean Port City: Salonica, 1821-1945

Ethnicity, identity, and urban space in Salonica during transformation from Ottoman Empire to Greek nation state. Themes: end of empire, nationalism, Orientalism, Young Turk revolution, workers and women, population movements, world wars, and the Holocaust, from local and international perspectives. Sources include travel accounts, imperial edicts, treaties, consular reports, memoirs, fiction, newspapers, folktales, postcards, photographs, film, maps, songs, and recipes.

5 units, Aut (Naar, D)

HISTORY 90Q. Buddhist Political and Social Theory

Stanford Introductory Seminar. Preference to sophomores. Historical and textual roots, emphasizing Tibetan, Bhutanese, and Thai Buddhism. Society and polity in Buddhist thought, Buddhist spiritual, social, and political practice. The state, sovereignty, and the individual and society. Law. Buddhist economic theory, Gross National Happiness, and sustainable economy. The Buddhist critique of neoliberalism. GER:DB-SocSci, EC-GlobalCom

4-5 units, Win (Mancall, M)

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 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, Aut (Wigen, K)

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. WIM GER:DB-SocSci, EC-GlobalCom

5 units, not given this year

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, Spr (Holloway, D)

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, Spr (Miller, K)

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 107. Introduction to Feminist Studies

(Same as FEMST 101.) What is feminism and why does it matter today? Debates over the status and meaning of feminism in the 21st century. Feminist theories and practices across topics that intersect with gender inequality such as race, health, socioeconomics, sexual orientation, international perspectives, new media, civil rights, and political change. Perspectives from philosophy, education, visual culture, literary and ethnic studies, performance and expressive arts, and social sciences. GER:DB-SocSci, EC-Gender

5 units, Aut (Freedman, E)

HISTORY 110A. Europe from Late Antiquity to 1500

Focus is on religion and politics. Issues include: the rise of Christianity and its impact on Rome; transformations of Catholicism and its institutions including the impact of barbarian tribes and the struggle between church and state; antisemitism, heresy, Crusades, and inquisition; courtly love; and scholasticism. GER:DB-Hum, WIM

5 units, Win (Buc, P)

HISTORY 110B. Machiavellian Moments: Europe's History, 1492-1793
Intellectual and social currents from the voyages of Columbus to the French Revolution. GER:DB-SocSci, EC-GlobalCom
5 units, not given this year

HISTORY 110C. Introduction to Modern Europe
From the late 18th century to the present. How Europeans responded to rapid social changes caused by political upheaval, industrialization, and modernization. Political ideologies such as liberalism, socialism, communism, and fascism that Europeans developed in response to revolution, nation building, imperialism, and international competition. GER:DB-Hum, WIM
5 units, Win (Sheehan, J)

HISTORY 120A. Foundations of Modern Russia
Culture, politics, and society from the beginnings to Catherine the Great. Orthodox Christianity; Vikings in Kievan Rus; the principality of Moscow and the Muscovite political system; church-state relations; the 15th-16th century Muscovite cultural synthesis in art and architecture and the shattering of that synthesis in the 17th century; the 17th-century schism in the church; cultural revolution and W. European elements under Peter the Great; Moscow versus St. Petersburg, or traditional versus westernized Russia; rise of serfdom; Catherine the Great as enlightened despot. GER:DB-Hum, EC-GlobalCom, WIM
4-5 units, Win (Kollmann, N)

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, Aut (Crews, R)

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, Win (Jolluck, K)

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, Win (Stokes, L)

HISTORY 132A. Enlightenment and the Arts
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, WIM
5 units, Aut (Lougee Chappell, C)

HISTORY 133A. Yorkist and Tudor England
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
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. GER:DB-Hum
5 units, Spr (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
5 units, not given this year

HISTORY 136D. European Intellectual History, 1789-Present
Sources include texts, art, music and, film. The impact of intellectual life and its products on society and politics and, conversely, of social and political developments on intellectual life. GER:DB-Hum
5 units, Win (Mancall, M)

HISTORY 137. The Holocaust
(Same as HISTORY 337.) 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 (Felstiner, M)

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, Spr (Ward, J)

HISTORY 138A. Germany and the World Wars, 1870-1990
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, Aut (Sheffer, E)

HISTORY 138B. Colonialism and Empire in Nineteenth-Century Europe
Colonialism as an intellectual project, commercial enterprise, and political strategy during from 1789-1914. Topics: the dissolution and collapse of empires; the debate over free trade and informal empire; the popularity of state-sponsored colonialism in newly-formed nation states like Germany and Italy or reconfigured ones like the Third Republic of France; and colonialism's relationship to traditional, land-based empire-building in Central and E. Europe during the run-up to WW I. Focus is on Germany, due to its embrace of both overseas and continental expansionism, and the continent, rather than Great Britain. GER:DB-SocSci
5 units, Spr (Naranch, B)

HISTORY 139. Modern Britain and the Empire
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, DB-Hum, EC-GlobalCom
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, WIM

5 units, Aut (Riskin, J)

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

The transformations in African societies and cultures from the beginning of colonial rule to the 90s. Case studies of colonialism and its impact on Africans. Debates over modernity, modernization, and tradition. The challenges of postcoloniality. Social changes in the organization of labor, family life, markets, and the built environment. Cultural changes in literature, music, representational art, and political thought. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Petrocelli, R)

HISTORY 150A. Colonial and Revolutionary America

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 (Rakove, J)

HISTORY 150B. 19th-Century America

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 (White, R)

HISTORY 150C. The United States in the Twentieth Century

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 (Camarillo, A; Chang, G)

HISTORY 151. Slavery and Freedom in American History

What does the fact that the preamble to the Declaration of Independence, with its professions about equality and unalienable rights, was written by a slaveowner tell us about the history of the U.S., and about the experience of African Americans? Topics: the transatlantic slave trade, slavery and the American Revolution, the Haitian Revolution, the African colonization movement, abolitionism, the Civil War, and Reconstruction. GER:DB-SocSci

5 units, Spr (Campbell, J)

HISTORY 154. 19th-Century U.S. Cultural and Intellectual History, 1790-1860

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 154A. Religion and American Society

How and why is the U.S. at once the most secular and the most religious industrialized nation in the world; why does it matter? How has American religion influenced reform, wars, politics, civil rights, popular culture,and national identity? Larger connections between religion and society; how religious institutions and movements have shaped the American experience and vice versa. GER:DB-Hum

5 units, Win (Herzog, J)

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. U.S. Women's History, 1890s-1990s

The transformation of Victorian womanhood in the late 19th century, including the workforce participation of immigrant and black women, educational and professional opportunities for middle class white women, impact of wars and depression on 20th-century women's lives, and rebirth of feminism. GER:DB-SocSci, EC-Gender

5 units, not given this year

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, WIM

5 units, Spr (White, R)

HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle

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, Aut (Carson, 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

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

5 units, Aut (Staff)

HISTORY 181B. The Middle East in the 20th Century

(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 (the mashrîq), with attention to Turkey, Iran, and Israel. GER:DB-SocSci

5 units, Spr (Beinin, J)

HISTORY 182. Medieval Islamic History, 600-1500

From the rise of Islam to the wake of the Mongol invasions. Focus Is on the Abbasid Empire (CA 750-1250) and its successor states in the context of a broader world history. Topics: the formation of early Muslim community, the Caliphate, spread of Islam, encounters with existing cultures, institutions of learning and spirituality, sectarian conflicts, social transformations, crime and punishment, markets, commercial networks, and everyday life. GER:DB-SocSci

5 units, Aut (Yilmaz, H)

HISTORY 182A. The Ottoman Empire
From the rise of the Empire in the 13th century to its end in WW I. Geographic coverage from the Balkans to Iraq and from N. Africa to the Caucasus. Military expansion; political, religious, and cultural institutions; relations with Iran, Europe, Africa,and S. Asia; nature of imperial rule; gender; trade; landholding; popular culture; law. GER:DB-SocSci
5 units, Win (Mikhail, A)

HISTORY 185B. Jews in the Modern World
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, not given this year

HISTORY 191. East Asia in the Early Buddhist Age
(Same as HISTORY 391.) Evolution of cities in imperial China through 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 examination of cases from European history. GER:DB-Hum, EC-GlobalCom
4-5 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
From the Tang-Song transition until the collapse of imperial order. The rise of absolutism and gentry society, and concomitant shifts in culture, gender relations, and the economy. The threat of steppe nomadism which produced the Mongol and Manchu conquest dynasties. The last imperial dynasty, the Qing, which solved traditional problems but was confronted by new ones. How simultaneous disasters of internal rebellion and Western imperialist invasion destroyed the old order. GER:DB-Hum
5 units, Win (Sommer, M)

HISTORY 194B. Japan in the Age of the Samurai
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
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, Spr (Moon, Y)

HISTORY 195C. Modern Japanese History
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, not given this year

HISTORY 196. South Asian Modernity, 1750-1950: Politics, Culture, Ideas
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, Aut (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, Win (Lewis, M)

HISTORY 198. The History of Modern China
Major historical transformations includling 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, Aut (Mullaney, T)

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 201A. Spatial History: Concepts, Methods, Problems
(Same as HISTORY 401A.) 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. GER:DB-SocSci
4-5 units, Aut (White, R; Frank, Z)

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, Aut (Holloway, D)

HISTORY 203A. Theories of the State from the Ancient World to the Present
(Same as HISTORY 303A.) The development and contemporary condition of thinking about the state. Philosophic, rhetorical, and historical contexts. Aristotle's Politics; early modern theorists such as Machiavelli, Hobbes, and Rousseau; transformations of the idea through the French Revolution by Sieyes and Hegel; and problematizations of the ideas in the last century by Schmidt and Foucault. GER:DB-Hum
4-5 units, not given this year

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 205B. Quantitative Methods in Historical Research
(Same as HISTORY 305B.) Latest techniques applied to research issues in current historical debates. Preparation of data, processing, statistical procedures to examine theoretical historical issues, and how to present quantitative materials in historical writing. Mathematical or statistical training not required. GER:DB-SocSci

4-5 units, Aut (Klein, H)

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. WIM GER:DB-SocSci, WIM

5 units, Spr (Lewis, M)

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.

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, Spr (Jolluck, K)

HISTORY 208S. 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 eveloped 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, WIM

5 units, Spr (Campbell, J)

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. Research paper. WIM

5 units, Spr (Riskin, J)

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 217A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
(Same as HISTORY 317A.) Topics include: Jewish, Christian, and Islamic theoretical discussions of poverty and charity; normative law versus actual practice; the voice of the poor in available source; and formal and informal institutions of charity in the medieval Mediterranean region. GER:DB-Hum

4-5 units, Aut (Miller, K)

HISTORY 217B. Land of Three Religions: Medieval Spain
(Same as HISTORY 317B.) The history of the Iberian peninsula from the Islamic conquest of 711 to the Christian expulsion of the Jews in 1492. Focus is on forms of confrontation, confluence, and hostile indifference among medieval Jews, Christians, and Muslims. What were undercurrents of aggression that gave rise to persecution of the other; what elements of commonality among groups gave rise to intellectual advancements? WIM

4-5 units, Win (Miller, K)

HISTORY 218A. Muslim Minorities in History
(Same as HISTORY 318A.) Muslim minorities under non-Muslim rule in different historical contexts configurationssuch as enclaves and diasporas, from the Middle Ages to the present. GER:DB-SocSci

4-5 units, Win (Miller, K)

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, Win (Jolluck, K)

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, Win (Crews, R)

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

5 units, not given this year

HISTORY 227B. Imperialism, the Media, and the Public Sphere
(Same as HISTORY 327B.) Focus is on late 19th and 20th centuries, including the postcolonial period. The role of journalists and other members of the media in creating the image of empire, in defending its legitimacy, and undermining its foundations. Topics include the technologies of communication that allowed information to flow between Europe and its imperial territories, and the relationships among imperial propoganda, colonial reportage, and anticolonial media campaigns. GER:DB-SocSci

4-5 units, Aut (Naranch, B)

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, Spr (Jolluck, K)

HISTORY 230F. Self-Policing, Denunciation, and Surveillance in Modern Europe
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.

5 units, Spr (Sheffer, E)

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, WIM

4-5 units, Win (Findlen, P)

HISTORY 232G. When Worlds Collide: The Trial of Galileo
(Same as HISTORY 332G.) Gateway course for History of Science and Medicine track. The 1633 condemnation by the Catholic Church of Galileo for believing the sun to be the center of the Universe, and its 1992 admission that Galileo was right. What do these events reveal about the relationship between science and religion? Why has the Galileo affair been one of the most discussed episodes in Italian history and the history of science? Documents from Galileo's life and trial and related literature on Renaissance Italy. Historians' interpretations of the trial in relation to its documentation. WIM 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, WIM

4-5 units, Spr (Stokes, L)

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 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, Win (Ward, J)

HISTORY 234. Paris and Politics, 1600-2006
The emergence of the modern city of lights. Paris as a mirror of French politics: top down, capi-tal to country, center to periphery, noble to bourgeois to people. Sources include maps, art, music, essays, and memoirs.

5 units, not given this year

HISTORY 234A. Marie Antoinette on Trial
From her arrival at Versailles until the present. Her 1793 trial as merely the formal phase of the judgmental public scrutiny she endured. Historical and contemporary controversies over the character and symbolism of Marie Antoinette, and the insights they offer into the changing politics and culture of the 18th century. Sources include letters and memoirs, paintings, caricatures, celebrations, and libels. GER:DB-SocSci

5 units, Win (Lougee Chappell, C)

HISTORY 236. The Ethics of 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. Nationalism, 1600 to the Present
Theory and practice of nationalism. What is the nation and how is it built? What is its relationship to the state? How do national movements adapt to changing ideological and geopolitical contexts? Case studies from nationalism's birthplace, Europe, and other regions. Sources include classic and recent scholarship, and primary sources by nationalists. GER:DB-SocSci

5 units, Aut (Ward, J)

HISTORY 238K. European Collaboration, Resistance, and Retribution: 1938-1948
Experiences of European populations under occupation or suzerainty during WW II. How did populations respond to an invader or hegemonic power such as Nazi Germany? What other options were open to them? How and why did postwar Europe judge their choices? Topics include high politics and individiual lives; sources include shcolarship and original documents. GER:DB-SocSci

5 units, Win (Ward, J)

HISTORY 239D. Capital and Empire
(Same as HISTORY 339D, HUMNTIES 191S.) 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, not given this year

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 241F. History of the Modern Fact
(Same as HISTORY 341F.) The early modern emergence and subsequent development and transformation of notions such as fact, evidence, experiment, demonstration, and objectivity that operate at the crux of modern science. Recent historical writing on the history of evidence, objectivity, and the modern fact. GER:DB-SocSci

4-5 units, not given this year

HISTORY 241G. History of the Senses
(Same as HISTORY 341G, STS 134, STS 234.) Technological, medical, philosophical, and scientific history of the five senses, drawing upon readings from antiquity to the present. How physiologists and philosophers have explained the functioning of the senses; how doctors have tampered with them both to help and to hinder; and how technologies including medical devices, scientific instruments, and tools of the arts have continually transformed the nature and experience of sensation. GER:DB-SocSci

4-5 units, not given this year

HISTORY 241S. Science and Culture Wars
Social, cultural, and political conflicts over scientific theories, beginning with the trial of Galileo, often presented as clashes between modern science and religious or political ideology. The cultural engagement of the sciences through such moments of conflict.

5 units, not given this year

HISTORY 242A. What is Life? The History of a Question
(Same as HISTORY 342A, HUMNTIES 191R.) History of attempts to understand the nature of life and mind by comparing living creatures with artificial machines and material arrangements. Imitations of animal life and human thought and discussions of relations between creatures and contraptions from antiquity onward, with an eye toward providing historical depth to current attempts to simulate life and mind. GER:DB-Hum

4-5 units, not given this year

HISTORY 242G. Representing the World: Maps, Statistics, and Photography
How individuals, groups, and governments sought to understand and describe the world around them, and how to transmit that information to others. Sources include various forms of information technology. Recommended: background in modern European and Atlantic history. GER:DB-SocSci

5 units, Spr (Wolfenstein, G)

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, Spr (Schiebinger, L)

HISTORY 243G. Tobacco and Health in World History
(Same as HISTORY 343G.) GER:DB-SocSci

4-5 units, Aut (Proctor, R)

HISTORY 243K. Endangered Species
During the past four centuries, more than 700 species of plants and animals have gone extinct throughout the world. The political, scientific, legal, and environmental histories of endangered and extinct species. Focus is on examples from fish and wildlife in the American West, including the grizzly bear, California condor, Pacific salmon, and desert tortoise.

5 units, Win (Staff)

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 are a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority. WIM 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 248. Islam in Africa
(Same as HISTORY 348.) Relations between African Muslims and the broader Islamic tradition over the last 1200 years. The roots of the Islamic tradition, its adoption, endogenization, and elaboration by African Muslims. The interplay of religion, politics, culture and society, and how tradition exercises influence even while being transformed. The worldviews and lives of African Muslims; how and why those worldviews and experiences changed. GER:DB-Hum, EC-GlobalCom

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, WIM

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, Spr (Hanretta, S)

HISTORY 251. Creating the American Republic
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 251G. Topics in Constitutional History
(Same as 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, Spr (Rakove, J)

HISTORY 252. Decision Making in International Crises: The A-Bomb, the Korean War, and the Cuban Missile Crisis
(Same as HISTORY 355.) For advanced undergraduates and graduate students. Primary documents and secondary literature. Topics include: the decision to use the atomic bomb on Japan, the Korean War, and the Cuban missile crisis. GER:DB-SocSci
4-5 units, not given this year

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, WIM
5 units, Aut (White, R)

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, ENGLISH 143E.) 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, Win (Elam, M; Carson, C)

HISTORY 255D. Racial Identity in the American Imagination
(Same as HISTORY 355D.) Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music. GER:DB-SocSci
4-5 units, Win (Hobbs, A)

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, Win (Chang, G)

HISTORY 257. The Politics and Ethics of Modern Science and Technology
(Same as HISTORY 347, STS 221.) The WW II decision to build and use the atomic bomb. The controversy over the H-bomb. The Oppenheimer loyalty-security case and the relationship of scientist to the state. Medical experimentation on humans and pitfalls of technology. Relations among science, technology, and university. GER:DB-Hum
4-5 units, not given this year

HISTORY 258. History of Sexuality in the U.S.
(Same as HISTORY 358. Formerly 265A.) Priority to History and Feminist Studies majors; a limited number of graduate students may be admitted. Recent historical interpretations of sexual violence, emphasizing the intersections of gender and race in the construction of rape in early America and in Canada, the racialization of rape in the U.S., lynching and anti-lynching in the U.S., and feminist responses to sexual violence. Prerequisite: consent of instructor. GER:DB-SocSci, EC-Gender
4-5 units, Spr (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. GER:DB-SocSci
5 units, not given this year

HISTORY 259B. Poverty and Homelessness in America II
Students participate in an internship with the Emergency Housing Consortium, the primary agency providing shelter for homeless people in Santa Clara and San Mateo counties, while learning about homelessness and poverty through readings and discussions. Prerequisite: interview with instructor. 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. Prerequisite: 259A.
3 units, not given this year

HISTORY 260. California's Minority-Majority Cities
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. GER:DB-SocSci, EC-AmerCul
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, Win (Hobbs, A)

HISTORY 264X. Chicana/o History
(Same as CHICANST 165A, CSRE 165A.) The history of Mexican-origin people in the U.S. from 1848 to the present. Mexican American experiences as integral to American history. Tthemes include the effects of conquest, patterns of migration, labor and the formation of social classes, racialization, gender roles, ideology, and political activism.
5 units, Aut (Staff)

HISTORY 265. Writing Asian American History
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, Win (Chang, G)

HISTORY 267E. Twentieth-Century American Politics
The intellectual underpinnings of movements such as progressivism, New Deal liberalism, and modern conservatism; how each translated belief into action. Focus is on primary sources. GER:DB-SocSci
5 units, Aut (Herzog, J)

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, Spr (Bernstein, B)

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 273B. Latin American Societies The Public and the Domestic Domain
(Same as HISTORY 373B.) How Peru, Mexico, and Brazil experience the relationships between the public institutions and symbols (such as the state, church, and the private realm of house, family, and sexuality) and emotional culture. Central aspects of Latin American culture such as honor, paternalism, and servitude, and how they were related to different forms of social stratification, ethnic conflicts, marriage, kinship, and power.
4-5 units, Spr (Staff), given once only

HISTORY 274A. Representing Revolution: The Mexican Revolution in Crossdisciplinary Perspective
(Same as HISTORY 374A.) History and historiography of the Mexican Revolution and its aftermath, from interlocking disciplinary perspectives. The relationship between race, class, gender, and state formation in 20th-century Mexico. How the revolution has been studied by historians and represented in film and photography. GER:DB-SocSci
4-5 units, Spr (Staff)

HISTORY 275F. Social Change in Latin America Since 1900
(Same as HISTORY 375F, LATINAM 201, LATINAM 301.) Changes in the social and demographic characteristics of Latin American populations since 1900 and the response of national governments in terms of the evolution of social welfare, health, and educational systems. Fulfills requirement for Latin American Studies honors seminar. Required core course for Latin American Studies master's students. GER:DB-SocSci
4-5 units, Aut (Klein, H)

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 279A. Visual and Urban Culture of Modern Latin America
(Same as HISTORY 379A.) Historical and social construction of vision and urban culture in 19th- and 20th-century Latin America. Changes in visual practice over time; the relationship between the production and consumption of images; and the shifting ways in which social relations have been structured by visual practices in modern Latin America. Topics: the transition from colonial society to postcolonial republic; urbanization; the rise of the modern metropolis; modern ways of seeing; the building of and relationship between projects of power, accommodation, and resistance in a comparative and transnational perspective. GER:DB-SocSci
4-5 units, Spr (Staff)

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, Spr (Kadhim, A)

HISTORY 281B. Modern Egypt
(Same as HISTORY 381B.) From just before the Napoleonic expedition of 1798 to the present. 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, Win (Beinin, J)

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, Aut (Beinin, J)

HISTORY 282A. State and Society in Modern Turkey
(Same as HISTORY 382A.) Turkey as a disputed successor to the Ottoman Empire, a buffer zone during the Cold War, an unsettled country between Europe and the Middle East, and a frequently interrupted fragile democracy. Themes: state-run developmentalism, modernization projects, social engineering, the dialectics between democracy and authoritarianism, invented national identities and histories, and secularism. Topics include transition from an empire to a nation state, political identities and ideologies, ethnic and religious conflicts, economic and social transformation, cultural formations, and foreign relations. GER:DB-SocSci
4-5 units, Aut (Yilmaz, H)

HISTORY 282B. Islamic Thought and Culture in the Premodern Middle East, 800-1800
(Same as HISTORY 382B.) Major intellectual and cultural currents across political, philosophical, literary, and religious traditions in social contexts from the rise of Islam to the advent of modernity. Focus is on the period when canons of Islamic thought and learning formed; Islamic diversity and universalism as sources of conflict and mediation in ideological conflicts; origins of lingering controversies and their social consequences; formation and defining features of disciplines and schools of thought; modes of production and transmission of knowledge; limits of intellectual freedom; and interaction with non-Islamic cultures. GER:DB-Hum
4-5 units, Win (Yilmaz, H)

HISTORY 282C. Environmental History of the Middle East
(Same as HISTORY 382C.) What can Middle East environmental history learn from a consideration of other regions? Major problems of the field, available sources, and directions for future research. Topics include Islam and the environment, animals, environmentalism, gardens, colonialism, disease, water and irrigation, and science and technology.
4-5 units, Spr (Mikhail, A)

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, Win (Beinin, J)

HISTORY 287B. International Law and the Palestinian-Israeli Conflict
(Same as HISTORY 387B.) Topics include international legal recognition of the right of Jews for a state; legal implications of defining Israel as a Jewish state; Arab-Palestinians and the right of return; practices of land expropriation within 1948 Israel; norms of international law applicable in the West Bank and Gaza; the legality of Jewish settlements in the West Bank and Gaza; the status of Jerusalem after 1967; international law and the Palestinian uprisings; the separation fence; legal status of the Gaza Strip after the disengagement. Background in Israeli or international law not required. GER:DB-SocSci
4-5 units, Aut (Holzman-Gazit, Y), given once only

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. Traitors and Collaborators in Colonial History
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.
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, Win (Wigen, K)

HISTORY 292. The Two Koreas
(Same as HISTORY 392.) Themes include historical and ideological origins of the division, the impact of the Japanese colonial rule, the Korean War, the ideas of key N. and S. Korean leaders, and the consolidation of the two different states 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, not given this year

HISTORY 293. Law and Society in Late Imperial China
(Same as HISTORY 392B.) 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. GER:DB-Hum
4-5 units, not given this year

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.
4-5 units, Spr (Sommer, M)

HISTORY 293D. Empire and Cosmopolitanism: Traveling Ideas in Global Political Thought
(Same as HISTORY 393D.) GER:DB-SocSci
4-5 units, Spr (Kumar, A)

HISTORY 294. Liberalism and Violence: A Conceptual History
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 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, Win (Mullaney, T)

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, Spr (Sommer, M)

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, WIM
5 units, Spr (Mullaney, T)

HISTORY 296E. Contentious Identities: The Formation of Race, Ethnicity, and Nationhood in Modern Japan
(Same as HISTORY 396E.) Exclusion and assimilation of minority groups including Ainu, Burakumin, Okinawans, Koreans, and Taiwanese; how this process was related to the construction of national, racial, and ethnic self-understanding in modern Japan. Ethno-racial formation and nationalism in Japanese society. GER:DB-SocSci
4-5 units, Spr (Staff)

HISTORY 297J. Introduction to Bhutan Studies
Required of students enrolled in the Bing Overseas Studies seminar in Bhutan in June/July, 2008; open to others. History, society, and culture of Bhutan including Bhutanese Buddhism. Sources include films. Student research projects.
1-5 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.
1 unit, Win (Staff)

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 (Carson, C), Spr (Carson, C)

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.)
1 unit, Spr (Kollmann, N; Roberts, R)

GRADUATE COURSES IN HISTORY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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 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 303A. Theories of the State from the Ancient World to the Present
(Same as HISTORY 203A.) The development and contemporary condition of thinking about the state. Philosophic, rhetorical, and historical contexts. Aristotle's Politics; early modern theorists such as Machiavelli, Hobbes, and Rousseau; transformations of the idea through the French Revolution by Sieyes and Hegel; and problematizations of the ideas in the last century by Schmidt and Foucault.
4-5 units, not given this year

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 Anthropology Ph.D. students. Teaching, lecturing, and curriculum development.
1 unit, Spr (Kollmann, N)

HISTORY 305B. Quantitative Methods in Historical Research
(Same as HISTORY 205B.) Latest techniques applied to research issues in current historical debates. Preparation of data, processing, statistical procedures to examine theoretical historical issues, and how to present quantitative materials in historical writing. Mathematical or statistical training not required.
4-5 units, Aut (Klein, H)

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, Aut (Holloway, D)

HISTORY 307A. Legal History Workshop
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 instructor.
4-5 units, Win (Kessler, A)

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, Spr (Jolluck, K)

HISTORY 309A. Postcolonial Readings: History and Modernity after Europe
Where is the postcolony? How does it come to terms with empire and modernity, its fragmented speech and bodies? Can postcolonial histories be rearranged to critique empire and yet reclaim europe as an ethical other? How postcolonial readings change the ethics and politics of a critique of modernity. Theories of resistance, power, language, archive, and allegory. Tensions among nation, myth, community, and the subject. Eurocentrism in modern thought. What it means to purge Europe from modern consciousness.
4-5 units, Win (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.
3-5 units, not given this year

HISTORY 311A. Family, Gender, and Production in Ancient Rome
(Same as CLASSGEN 220.) Seminar. The household as the basic unit of production in Rome in the context of family relations and ideologies of gender. Methodological challenges of doing social and economic history from literary, epigraphic, and literary texts. Demography of family and kinship in ancient Rome. Ideologies of gender and family roles and their influence on economic production. Economic theories of the family and human capital.
4-5 units, not given this year

HISTORY 311G. Big Ancient History
(Same as CLASSHIS 312.) How the shift away from thinking about European history in terms of a western civilization model toward embedding it in stories of how global history affects research and teaching on ancient Greece and Rome. Conventional, evolutionary, and global history narratives of the past 5,000 to 15,000 years and some new ideas about how Greco-Roman history might fit into different storylines.
4-5 units, Spr (Morris, I)

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. 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 314. Graduate 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, Spr (Buc, P)

HISTORY 317A. Poverty and Charity in Medieval Christianity, Judaism, and Islam
(Same as HISTORY 217A.) Topics include: Jewish, Christian, and Islamic theoretical discussions of poverty and charity; normative law versus actual practice; the voice of the poor in available source; and formal and informal institutions of charity in the medieval Mediterranean region.
4-5 units, Aut (Miller, K)

HISTORY 317B. Land of Three Religions: Medieval Spain
(Same as HISTORY 217B.) The history of the Iberian peninsula from the Islamic conquest of 711 to the Christian expulsion of the Jews in 1492. Focus is on forms of confrontation, confluence, and hostile indifference among medieval Jews, Christians, and Muslims. What were undercurrents of aggression that gave rise to persecution of the other; what elements of commonality among groups gave rise to intellectual advancements?
4-5 units, Win (Miller, K)

HISTORY 318A. Muslim Minorities in History
(Same as HISTORY 218A.) Muslim minorities under non-Muslim rule in different historical contexts configurationssuch as enclaves and diasporas, from the Middle Ages to the present.
4-5 units, Win (Miller, K)

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, Win (Weiner, A)

HISTORY 322. Topics in Early Modern Russian History
4-5 units, Aut (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, Win (Crews, R)

HISTORY 323B. Research Methodologies in Early Modern Russian History
4-5 units, Win (Kollmann, N)

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, Spr (Crews, R)

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.
5 units, not given this year

HISTORY 327B. Imperialism, the Media, and the Public Sphere
(Same as HISTORY 227B.) Focus is on late 19th and 20th centuries, including the postcolonial period. The role of journalists and other members of the media in creating the image of empire, in defending its legitimacy, and undermining its foundations. Topics include the technologies of communication that allowed information to flow between Europe and its imperial territories, and the relationships among imperial propoganda, colonial reportage, and anticolonial media campaigns.
4-5 units, Aut (Naranch, B)

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 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, Spr (Jolluck, K)

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, Spr (Lougee Chappell, C)

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 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, Win (Sheehan, J)

HISTORY 331C. Core Colloquium on Modern Europe
The historiography of 20th-century Europe. Topics include WW I, the Russian Revolution, National Socialism, and the EU.
4-5 units, not given this year

HISTORY 331D. Core Colloquium on Modern Europe: Intellectual History

4-5 units, not given this year

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, Win (Findlen, P)

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, Aut (Riskin, J)

HISTORY 332G. When Worlds Collide: The Trial of Galileo

(Same as HISTORY 232G.) Gateway course for History of Science and Medicine track. The 1633 condemnation by the Catholic Church of Galileo for believing the sun to be the center of the Universe, and its 1992 admission that Galileo was right. What do these events reveal about the relationship between science and religion? Why has the Galileo affair been one of the most discussed episodes in Italian history and the history of science? Documents from Galileo's life and trial and related literature on Renaissance Italy. Historians' interpretations of the trial in relation to its documentation. WIM

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, Spr (Stokes, L)

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 334. Enlightenment Seminar

(Same as 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.

3-5 units, Win (Baker, K)

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.

5 units, not given this year

HISTORY 336. Modern France

(Daughton)

4-5 units, not given this year

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.) 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 (Felstiner, M)

HISTORY 337C. Memory, History, and Education

(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, Spr (Wineburg, S)

HISTORY 338A. Modern Britain: Facing Europe and Empire, 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, not given this year

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, HUMNTIES 191S.) 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, not given this year

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 341F. History of the Modern Fact

(Same as HISTORY 241F.) The early modern emergence and subsequent development and transformation of notions such as fact, evidence, experiment, demonstration, and objectivity that operate at

the crux of modern science. Recent historical writing on the history of evidence, objectivity, and the modern fact.

4-5 units, not given this year

HISTORY 341G. History of the Senses
(Same as HISTORY 241G, STS 134, STS 234.) Technological, medical, philosophical, and scientific history of the five senses, drawing upon readings from antiquity to the present. How physiologists and philosophers have explained the functioning of the senses; how doctors have tampered with them both to help and to hinder; and how technologies including medical devices, scientific instruments, and tools of the arts have continually transformed the nature and experience of sensation.

4-5 units, not given this year

HISTORY 342A. What is Life? The History of a Question
(Same as HISTORY 242A, HUMNTIES 191R.) History of attempts to understand the nature of life and mind by comparing living creatures with artificial machines and material arrangements. Imitations of animal life and human thought and discussions of relations between creatures and contraptions from antiquity onward, with an eye toward providing historical depth to current attempts to simulate life and mind.

4-5 units, not given this year

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, Spr (Schiebinger, L)

HISTORY 343G. Tobacco and Health in World History
(Same as HISTORY 243G.)

4-5 units, Aut (Proctor, R)

HISTORY 345A. Core Colloquium: Precolonial Africa

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 347. The Politics and Ethics of Modern Science and Technology
(Same as HISTORY 257, STS 221.) The WW II decision to build and use the atomic bomb. The controversy over the H-bomb. The Oppenheimer loyalty-security case and the relationship of scientist to the state. Medical experimentation on humans and pitfalls of technology. Relations among science, technology, and university.

4-5 units, not given this year

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 348. Islam in Africa
(Same as HISTORY 248.) Relations between African Muslims and the broader Islamic tradition over the last 1200 years. The roots of the Islamic tradition, its adoption, endogenization, and elaboration by African Muslims. The interplay of religion, politics, culture and society, and how tradition exercises influence even while being transformed. The worldviews and lives of African Muslims; how and why those worldviews and experiences changed.

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 are 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, Spr (Hanretta, S)

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

4-5 units, Spr (Camarillo, A)

HISTORY 351F. Core in American History, Part VI

4-5 units, Spr (Bernstein, B)

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, Win (Gordon, R)

HISTORY 355. Decision Making in International Crises: The A-Bomb, the Korean War, and the Cuban Missile Crisis
(Same as HISTORY 252.) For advanced undergraduates and graduate students. Primary documents and secondary literature. Topics include: the decision to use the atomic bomb on Japan, the Korean War, and the Cuban missile crisis.

4-5 units, not given this year

HISTORY 355D. Racial Identity in the American Imagination
(Same as HISTORY 255D.) Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music.

4-5 units, Win (Hobbs, A)

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, Win (Chang, G)

HISTORY 358. History of Sexuality in the U.S.
(Same as HISTORY 258. Formerly 265A.) Priority to History and Feminist Studies majors; a limited number of graduate students may be admitted. Recent historical interpretations of sexual violence, emphasizing the intersections of gender and race in the construction of rape in early America and in Canada, the racialization of rape in

the U.S., lynching and anti-lynching in the U.S., and feminist responses to sexual violence. Prerequisite: consent of instructor.

4-5 units, Spr (Freedman, E)

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, Spr (Bernstein, B)

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 373B. Latin American Societies The Public and the Domestic Domain

(Same as HISTORY 273B.) How Peru, Mexico, and Brazil experience the relationships between the public institutions and symbols (such as the state, church, and the private realm of house, family, and sexuality) and emotional culture. Central aspects of Latin American culture such as honor, paternalism, and servitude, and how they were related to different forms of social stratification, ethnic conflicts, marriage, kinship, and power.

4-5 units, Spr (Staff), given once only

HISTORY 374A. Representing Revolution: The Mexican Revolution in Crossdisciplinary Perspective

(Same as HISTORY 274A.) History and historiography of the Mexican Revolution and its aftermath, from interlocking disciplinary perspectives. The relationship between race, class, gender, and state formation in 20th-century Mexico. How the revolution has been studied by historians and represented in film and photography.

4-5 units, Spr (Staff)

HISTORY 375F. Social Change in Latin America Since 1900

(Same as HISTORY 275F, LATINAM 201, LATINAM 301.) Changes in the social and demographic characteristics of Latin American populations since 1900 and the response of national governments in terms of the evolution of social welfare, health, and educational systems. Fulfills requirement for Latin American Studies honors seminar. Required core course for Latin American Studies master's students.

4-5 units, Aut (Klein, H)

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 379A. Visual and Urban Culture of Modern Latin America

(Same as HISTORY 279A.) Historical and social construction of vision and urban culture in 19th- and 20th-century Latin America. Changes in visual practice over time; the relationship between the production and consumption of images; and the shifting ways in which social relations have been structured by visual practices in modern Latin America. Topics: the transition from colonial society to postcolonial republic; urbanization; the rise of the modern metropolis; modern ways of seeing; the building of and relationship between projects of power, accommodation, and resistance in a comparative and transnational perspective.

4-5 units, Spr (Staff)

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, Win (Beinin, J)

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, Aut (Beinin, J)

HISTORY 382A. State and Society in Modern Turkey

(Same as HISTORY 282A.) Turkey as a disputed successor to the Ottoman Empire, a buffer zone during the Cold War, an unsettled country between Europe and the Middle East, and a frequently interrupted fragile democracy. Themes: state-run developmentalism, modernization projects, social engineering, the dialectics between democracy and authoritarianism, invented national identities and histories, and secularism. Topics include transition from an empire to a nation state, political identities and ideologies, ethnic and religious conflicts, economic and social transformation, cultural formations, and foreign relations.

4-5 units, Aut (Yilmaz, H)

HISTORY 382B. Islamic Thought and Culture in the Premodern Middle East, 800-1800

(Same as HISTORY 282B.) Major intellectual and cultural currents across political, philosophical, literary, and religious traditions in social contexts from the rise of Islam to the advent of modernity. Focus is on the period when canons of Islamic thought and learning formed; Islamic diversity and universalism as sources of conflict and mediation in ideological conflicts; origins of lingering controversies and their social consequences; formation and defining features of disciplines and schools of thought; modes of production and transmission of knowledge; limits of intellectual freedom; and interaction with non-Islamic cultures.

4-5 units, Win (Yilmaz, H)

HISTORY 382C. Environmental History of the Middle East

(Same as HISTORY 282C.) What can Middle East environmental history learn from a consideration of other regions? Major problems of the field, available sources, and directions for future research. Topics include Islam and the environment, animals, environmentalism, gardens, colonialism, disease, water and irrigation, and science and technology.

4-5 units, Spr (Mikhail, A)

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, Win (Beinin, J)

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 387B. International Law and the Palestinian-Israeli Conflict
(Same as HISTORY 287B.) Topics include international legal recognition of the right of Jews for a state; legal implications of defining Israel as a Jewish state; Arab-Palestinians and the right of return; practices of land expropriation within 1948 Israel; norms of international law applicable in the West Bank and Gaza; the legality of Jewish settlements in the West Bank and Gaza; the status of Jerusalem after 1967; international law and the Palestinian uprisings; the separation fence; legal status of the Gaza Strip after the disengagement. Background in Israeli or international law not required.
4-5 units, Aut (Holzman-Gazit, Y), given once only

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, Spr (Mullaney, T)

HISTORY 391. East Asia in the Early Buddhist Age
(Same as HISTORY 191.) Evolution of cities in imperial China through 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 examination of cases from European history.
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 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, Win (Wigen, K)

HISTORY 392. The Two Koreas
(Same as HISTORY 292.) Themes include historical and ideological origins of the division, the impact of the Japanese colonial rule, the Korean War, the ideas of key N. and S. Korean leaders, and the consolidation of the two different states after the Korean War.
4-5 units, Win (Moon, Y)

HISTORY 392B. Law and Society in Late Imperial China
(Same as HISTORY 293.) 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, not given this year

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, not given this year

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. Readings in Korean History
Topics: the characteristics of the Choson dynasty, the reform movements and rebellions in the 19th century, Korean nationalism, the debates on modernity in colonial Korea, and decolonization and the Korean War. Comparative perspective concerning how Korea's path to modernity differed from those of China and Japan.
4-5 units, Aut (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, Aut (Sommer, M)

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, Spr (Sommer, M)

HISTORY 393D. Empire and Cosmopolitanism: Traveling Ideas in Global Political Thought
(Same as HISTORY 293D.)
4-5 units, Spr (Kumar, A)

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, Win (Mullaney, T)

HISTORY 396D. Modern Japan
Major historical problems and historiographic trends in from the Meiji period to the present. Themes include 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, not given this year

HISTORY 396E. Contentious Identities: The Formation of Race, Ethnicity, and Nationhood in Modern Japan

(Same as HISTORY 296E.) Exclusion and assimilation of minority groups including Ainu, Burakumin, Okinawans, Koreans, and Taiwanese; how this process was related to the construction of national, racial, and ethnic self-understanding in modern Japan. Ethno-racial formation and nationalism in Japanese society.

4-5 units, Spr (Staff)

HISTORY 399A. Design and Methodology for International Field Research

(Same as HISTORY 299X.)

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

(Same as HISTORY 201A.) 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, Aut (White, R; Frank, Z)

HISTORY 401B. Spatial History, Part II

Prerequisite: 401A.

4-5 units, Win (White, R; Frank, Z)

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, Win (Kollmann, N), Spr (Kollmann, N)

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

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, not given this year

HISTORY 424B. The Soviet Civilization

4-5 units, not given this year

HISTORY 424C. The End of Communism in Europe

Causes, course, and consequences.

4-5 units, Spr (Weiner, A)

HISTORY 430. Graduate Research Seminar: Early Modern Europe, 1400-1800

Prerequisite: 332D or 332H.

4-5 units, Spr (Findlen, P)

HISTORY 433A. European History

4-5 units, Aut (Sheehan, J)

HISTORY 433B. European History

4-5 units, Win (Sheehan, J)

HISTORY 438. European History Workshop

All European history graduate students in residence register for this 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. U.S. Women's Family and Sexual History

Research, design, research methods, and historical writing on topics in the history 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. U.S. Women's Family and Sexual History, Part II

Prerequisite: 461A.

4-5 units, Spr (Freedman, E)

HISTORY 470A. Research Seminar in Latin American Social History

How to use primary sources such as government records, estate inventories, and parish records for social history. 470A: methodological readings in social history and the development of a research project. 470B: research and writing of a seminar paper. Prerequisite: consent of instructor.

4-5 units, not given this year

HISTORY 470B. Research Seminar in Latin American Social History II
How to use primary sources such as government records, estate inventories, and parish records for social history. 470A: methodological readings in social history and the development of a research project. 470B: research and writing of a seminar paper. Prerequisite: consent of instructor.
4-5 units, not given this year

HISTORY 486A. Graduate Research Seminar in Jewish History
4-5 units, not given this year

HISTORY 486B. Graduate Research Seminar in Jewish History
4-5 units, not given this year

HISTORY 492. Society in Ancient and Medieval China
Proseminar on conducting research in ancient or medieval China. Focus is on the theme of the emotions of the period. Sources include theoretical and comparative materials in secondary literature and primary sources. Students present research paper to class.
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, not given this year

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, Win (Wigen, K)

HISTORY 497B. Maps and Gazetters as Sources for East Asian History, Part 2
Prerequisite: HISTORY 497A.
4-5 units, Spr (Wigen, K)

HISTORY 499X. Graduate Research
Units by arrangement. May be repeated for credit.
1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS STUDIES COURSES IN HISTORY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BERLIN HISTORY COURSES

OSPBER 70. The Long Way to the West: German History from the 18th Century to the Present
5 units, Spr (Jander, M)

FLORENCE HISTORY COURSES

OSPFLOR 33. The Americanization of Italy
4 units, Spr (Scarpellini, E)

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
5 units, Win (Campani, E)

OSPFLOR 106V. Italy: From Agrarian to Postindustrial Society
4 units, Aut (Mammarella, G)

MADRID HISTORY COURSES

OSPMADRD 25. European Legal History
5 units, Aut (Herzog, T)

OSPMADRD 26. Issues in European Law
4 units, Aut (Herzog, T)

OSPMADRD 34. Modern Spain
5 units, Win (Herzog, T)

OSPMADRD 35. Issues in Spanish History
4 units, Win (Herzog, T)

OSPMADRD 67. Women in Spain: From Tradition to Postmodernity
5 units, Spr (Botella Ordinas, E)

MOSCOW HISTORY COURSES

OSPMOSC 75. Soviet and Post-Soviet Leaders
5 units, Aut (Weiner, A)

OSPMOSC 76. Soviet History in Present-Day Russian Media
3 units, Aut (Weiner, A)

OXFORD HISTORY COURSES

OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850
4-5 units, Aut (Tyack, G)

OSPOXFRD 66. Oxford: The Culture of the City
3 units, Aut (Chance, H), Win (Chance, H)

OSPOXFRD 70. The History of London
5 units, Spr (Tyack, G)

OSPOXFRD 221Y. Art and Society in Britain
4-5 units, Win (Tyack, G)

PARIS HISTORY COURSES

OSPPARIS 81. France During the Second World War: Between History and Memory
5 units, Win (Virgili, F)

SANTIAGO HISTORY COURSES

OSPSANTG 62. Topics in Chilean History
4-5 units, Win (Jaksic, I)

OSPSANTG 68. The Emergence of Nations in Latin America
4-5 units, Aut (Jaksic, I), Spr (Jaksic, I)

HISTORY AND PHILOSOPHY OF SCIENCE (HPS) COURSES

For information on the Program in History and Philosophy of Science, see the "History and Philosophy of Science" section of this bulletin.

UNDERGRADUATE COURSES IN HISTORY AND PHILOSOPHY OF SCIENCE

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, Aut (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. What is Science? Explaining Nature from Pythagoras to Popper
How many great changes in science were accompanied by changes in method. Case studies of scientific practice from ancient Greece to the 20th century; how theory and practice have influenced each other. What kinds of science and technology emerged under different methods; how science influenced ideas about knowledge, discovery, and truth. What is or is not science, such as the debate over intelligent design. GER:DB-Hum
5 units, Win (McCaskey, J)

HPS 156. History of Women and Medicine in the United States
Women's bodies in sickness and health, and encounters with lay and professional healers from the 18th century to the present. Historical contstruction 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)

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.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OVERSEAS STUDIES COURSES IN HISTORY AND PHILOSOPHY OF SCIENCE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE HISTORY AND PHILOSOPHY OF SCIENCE COURSES

OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought

5 units, Win (Galluzzi, P)

HUMAN BIOLOGY (HUMBIO) COURSES

For information on the undergraduate program in Human Biology, see the "Human Biology" section of this bulletin. The faculty and staff of Human Biology prepare a student handbook, on the web at http://humbio.stanford.edu/, that provides a detailed description of the Human Biology major and outlines possible areas of concentration. It reflects the most up-to-date information for the academic year and is the definitive guide for Human Biology majors.

UNDERGRADUATE COURSES IN HUMAN BIOLOGY

Required core sequences (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. Courses numbered 100 through 189 fulfill the Human Biology upper-division requirement. These course are open to non-majors with the proper prerequisites; Human Biology majors have preference when enrollment is restricted.

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; Brown, M)

HUMBIO 2C. Introductory Chemistry Seminar
Preparation for biochemistry in the Human Biology core. Limited to students who have not previously enrolled in college chemistry classes or passed the Human Biology core chemistry exam.

1 unit, Aut (Wandless, T)

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, a passing grade on the Human Biology core chemistry exam, or HUMBIO 2C. 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 (Winters, J)

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 (Heller, C; 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; Barr, D)

HUMBIO 6. Human Origins
(Same as ANTHRO 6, ANTHRO 206, BIO 106.) 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, Win (Klein, R)

HUMBIO 14. Introduction to Anthropological Genetics
(Same as ANTHRO 14.) How genetic methods address anthropological questions. Examples include the evolutionary relationships between humans and the apes, the place of the Neanderthals in human evolution, the peopling of the New World, ancient DNA, the genetics of ethnicity, forensic genetics, genomics, behavioral genetics, and hereditary diseases. GER:DB-NatSci

3-5 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, described in physiological terms, and is 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, Win (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 84Q. Social Justice, Responsibility, Health

Stanford Introductory Seminar. Preference to sophomores. Reducing health disparities among segments of the US population is an overarching 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.

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.

3 units, Win (Murray, A)

HUMBIO 87Q. Women and Aging

(S,Sem Same as MED 87Q.) Stanford Introductory Seminar. Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. GER:EC-Gender

5 units, Win (Winograd, 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 97Q. Sport, Exercise, and Health: Exploring Sports Medicine

(S,Sem Same as ORTHO 97Q.) Stanford Introductory Seminar. 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), 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)

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. 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 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. (HEF III; DA-C) GER:DB-SocSci

3-5 units, not given this year

HUMBIO 115. Long-Term Human Interaction with Environment

(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, Spr (Truncer, J)

HUMBIO 116. Controlling Climate Change in the 21st Century

(Same as BIO 147, BIO 247, 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, Win (Schneider, S; Mastrandrea, M), alternate years, not given next year

HUMBIO 117. Human Behavioral Ecology

(Same as ANTHRO 361.) 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

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

3-5 units, Win (Bird, R)

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, Spr (Tuljapurkar, S)

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, Spr (Baker, L)

HUMBIO 121A. Providing and Evaluating Health Education for Underserved Children
(Same as INDE 262A.) A service learning experience in community health. Students participate in developing health education materials for underserved middle school students based on principles of human biology and health science ; become knowledgeable about logic modes and other evaluation tools available for evaluating health education modules and community intervnetions; develop an implementation and evaluation plan. Prequisite for undergraduates: Human Biology core or equivalent or consent of instructor.

3 units, Aut (Rodriguez, E; Morioka-Douglas, N)

HUMBIO 121B. Providing and Evaluating Health Education for Underserved Children
(Same as INDE 262B.) Students implement the health education activities/modules developed in INDE 262A/HUMBIO 121A, solicit evaluative feedback, and present the outcomes.

3 units, Win (Rodriguez, E; Morioka-Douglas, N)

HUMBIO 122. Beyond Health Care--Seeking Health in Society
(Same as PEDS 222.) Available evidence both 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: 4B or equivalent and background in research methods and statistics.

3 units, Win (Rodriguez, E)

HUMBIO 122S. Social Class, Race, Ethnicity, Health
(Same as SOC 141A.) 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

5 units, Win (Barr, D)

HUMBIO 123. Obesity in America: Clinical and Public Health Implications
Interdisciplinary clinical, research, and policy approaches. The prevalence, predictors, and consequences of obesity and diabetes; biological and physiological mechanisms; clinical treatments including medications and surgery; and the relevance of behavioral, environmental, economic, and policy approaches to obesity prevention and control. Prerequisite: Human Biology core or equivalent, or consent of instructor.

3 units, Win (Kiernan, M; Stafford, R)

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, INDE 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.

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. Prerequisite: 4B or equivalent, or consent of instructor.

4 units, Win (Heaney, C), alternate years, not given next year

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. Prerequisite: 4B or equivalent, 127A, or consent of instructor.

4 units, Spr (Heaney, C), alternate years, not given next year

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. Prerequisites: Human Biology core or equivalent or consent of instructor. GER:EC-Gender

4 units, Aut (Murray, A), Win (Murray, A)

HUMBIO 129S. International Health
Concepts of health and wellness and major descriptors and determinants of health status. International organizations and control programs, disease-related problems within population groups from an epidemiologic viewpoint, health care delivery methods, efforts to improve health through examination of current and previous programs and projects. Cultural, economic, and political contexts in international health. Prerequisites: Human Biology core or equivalent or consent of instructor.

4 units, not given this year

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 (Staff)

HUMBIO 131. Interdisciplinary Design for Agile Aging
(Same as CS 379Y, MED 279Y.) Offered by the d.school. Perspectives from computer science, design, social and behavioral sciences, physiology, geriatrics, and biodesign to develop projects that address the potential of people to maintain vitality and mobility as they age. New ways to integrate computer and device technologies with behavioral and social interventions. Focus is on small-group projects based on real-world need finding. Prerequisite: background in one of design, computing, medicine, behavioral sciences, communications, or business.

3-4 units, Win (Winograd, C; Winograd, T; Friedlander, A; Yock, P)

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. 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, not given this year

HUMBIO 135S. Applied Topics in Exercise Physiology and Metabolism
Scientific research on topics related to exercise physiology, aging and mobility. Exercise physiology lab and field work experience. Student presentations. Summary paper. Enrollment limited to 12. Prerequisites: Human Biology core or equivalent; preference to those who have taken 135.

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 141. 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.

4 units, not given this year

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, Aut (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, Spr (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 equivalent, or consent of instructor. GER:EC-Gender

4 units, not given this year

HUMBIO 145. Birds to Words: Cognition, Communication, and Language
(Same as PSYCH 137, PSYCH 239A.) Although the communicative abilities of animals are determined by their genetic endowment, and human communicative skills dwarf those of other species, the relation between language and genetics remains the subject of debate. Is human language genetically specified? Or are human communicative powers just one facet of human cognitive advantage? Focus is on the nature and origins of language, using evidence from studies of animals, children, and adults. GER:DB-SocSci

4 units, Aut (Fernald, A; Ramscar, M)

HUMBIO 146. Culture and Mental Illness
(Same as ANTHRO 181.) 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 units, Spr (Luhrmann, T)

HUMBIO 147. Population and Environment in China
Population movement and its environmental consequences from late imperial times to the present, analyzed as part of the social landscape created by radical social change. Topics include the causes of rapid population growth in late imperial times, environmental consequences, and reasons for and results of birth control programs undertaken by the Peoples' Republic. Prerequisite: Human Biology core or equivalent or consent of instructor.

5 units, Spr (Wolf, A)

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, Aut (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, Aut (Siegel, R)

HUMBIO 155H. Humans and Viruses I
(Same as MI 155H.) 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

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

3 units, Spr (Katzenstein, D)

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, Win (Popat, R)

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, Win (Heller, C)

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, Win (Williams, K; Rasgon, N; Zappert, L)

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. Prerequisites: BIO 42, HUMBIO 4A, or equivalents. GER:DB-NatSci

4 units, alternate years, not given this year

HUMBIO 164. Critical Implications of Human Memory Research
Concepts in human memory research, emphasizing most recent debates and advances in methodology. Applications to other fields. Focus is on evaluating scientific findings and becoming critical consumers of scientific research. Topics include eyewitness memory, mood disorders, aging, testing effects, childhood amnesia, psychopharmacology, fMRI, and everyday instances of forgetting. How memory research may inform medical, educational, and legal policy.

4 units, Win (Kuhl, N)

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 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, Spr (Abrams, W)

HUMBIO 172A. 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, Win (Abrams, W), alternate years, not 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. 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. Prerequisite: Human Biology core or equivalent or consent of instructor.

3 units, Spr (Zaroff, L)

HUMBIO 180. Human Osteology

(Same as ANTHRO 175, ANTHRO 275.) The human skeleton. Focus is on identification of fragmentary human skeletal remains. Analytical methods include forensic techniques, archaeological analysis, paleopathology, and age/sex estimation. Students work independently in the laboratory with the skeletal collection. GER:DB-NatSci

5 units, Win (DeGusta, D)

HUMBIO 182. Biology, Culture, and Human Behavior

The debate between those who argue that human behavior is best understood as the product of biological evolution and those who contend that it is largely the creation of particular cultures. Is there a human nature, and, if so, what is it? Prerequisite: HUMBIO 2A, 2B or equivalent. GER:DB-SocSci

5 units, Win (Wolf, A)

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 184. Darwin's Legacy

(Same as ANTHRO 163D.) New understandings that have followed on Darwinian principles; remaining frontiers of research; areas of controversy.His legacy in anthropology, biology, religion, medicine, psychology, philosophy, and literature. 3 units requires discussion section and term paper.

1-3 units, Aut (Durham, W; Boggs, C; Dirzo, R; Siegel, R)

HUMBIO 186. Biological Clocks

(Same as BIO 135.) The biological basis for endogenous timekeeping in organisms from flies to human beings. How biological clocks are constructed at the molecular, tissue, and behavioral levels; how these clocks interact with other physiological systems and allow animals to anticipate changes in their environment. Applications of circadian rhythm principles to treating human disorders and diseases such as cancer. Prerequisite: Biology or Human Biology core, or consent of instructor. GER:DB-NatSci

3 units, not given this year

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 repeated for credit; petition required for more than 5 units. Prerequisite: 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, pre-approved 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; Cacciari, L), Win (Boggs, C; Cacciari, L), 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)

OVERSEAS STUDIES COURSES IN HUMAN BIOLOGY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

AUSTRALIA HUMAN BIOLOGY COURSES

OSPAUSTL 10. Coral Reef Ecosystems
3 units, Aut (Hoegh-Guldberg, O; Ward, S; Arrigo, K)

OSPAUSTL 20. Coastal Resource Management
3 units, Aut (Johnstone, R)

OSPAUSTL 30. Coastal Forest Ecosystems
3 units, Aut (Hall, J)

BERLIN HUMAN BIOLOGY COURSES

OSPBER 47. Ethics in Medicine and Everyday Life
4 units, Aut (Casper, R)

MADRID HUMAN BIOLOGY COURSES

OSPMADRD 72. Issues in Bioethics Across Cultures
5 units, Win (de Lora del Toro, P)

PARIS HUMAN BIOLOGY COURSES

OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time
4-5 units, Win (Fessler, J)

SANTIAGO HUMAN BIOLOGY COURSES

OSPSANTG 44. Human Genetic Diversity in Individuals and Populations
4-5 units, Win (Francke, U)

HUMANITIES AND SCIENCES (HUMSCI) COURSES

These courses are offered by the School of Humanities and Sciences.

UNDERGRADUATE COURSES IN HUMANITIES AND SCIENCES

HUMSCI 190. Individually Designed Major Honor's Thesis
May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (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)

IMMUNOLOGY (IMMUNOL) COURSES

For information on graduate programs in Immunology, see the "Immunology" section of this bulletin. Course and laboratory instruction in the Immunology Program conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN IMMUNOLOGY

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: Biology or Human Biology core.

3 units, Win (Steinman, L; Brownell, S; Price, J)

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.

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, Win (Utz, P)

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, hematpoietic 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 215. Principles of Biological Technologies
(Same as MI 215.) Required of first-year graduate students in Microbiology and Immunology, and the Immunology program. 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, organic chemistry, and physics.

3 units, Spr (Kirkegaard, K)

IMMUNOL 240. Professional and Leadership Development
Foundational skills for professional and leadership development. How to communicate, resolve conflict, negotiate, and present. Workshop format integrating intellectual and experiential learning.
2 units, Spr (Radermacher, A; Allen, J; Krams, S)

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 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: Biology 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.
1-15 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), Win (Steinman, L), Spr (Steinman, L)

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)

INSTITUTE FOR INTERNATIONAL STUDIES (FREEMAN SPOGLI) (IIS) COURSES

For information on the Freeman Spogli Institute for International Studies, see the "Institute for International Studies" section of this bulletin.

UNDERGRADUATE COURSES IN INSTITUTE FOR INTERNATIONAL STUDIES (FREEMAN SPOGLI)

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 (Staff), Win (Stedman, S), Spr (Kapur, S; Cuellar, M)

INTERDISCIPLINARY PROGRAM IN ENVIRONMENT AND RESOURCES (IPER) COURSES

For information on graduate programs in the Interdisciplinary Program in Environment and Resources, including lists of courses which fulfill breadth requirements, see the " Interdisciplinary Graduate Program in Environment and Resources" section of this bulletin.

GRADUATE COURSES IN INTERDISCIPLINARY PROGRAM IN ENVIRONMENT AND RESOURCES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

IPER 200. Going Green: Research, Writing, and Reporting to the Public
Preference to graduate students. Focus is on environmental, economic, and cultural consequences of day-to-day behavioral choices such as computers on at all times versus only when used, or biodegradable versus metal forks at cafés. Sources include scientific and technical literature from disciplines such as energy, biology, and economics. How to write summaries that integrate relevant information for a lay audience. Prerequisite: consent of instructor.
3 units, Aut (Staff), Spr (Staff)

IPER 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, Spr (Root, T)

IPER 220. Special Topics Seminar
For IPER Ph.D. and joint degree 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 be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPER 220A. Special Topics Seminar
For IPER Ph.D. and joint degree 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 be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPER 220B. Special Topics Seminar
For IPER Ph.D. and joint degree 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 be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Staff)

IPER 220C. Special Topics Seminar
For IPER Ph.D. and joint degree 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 be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Staff)

IPER 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: 241 or ECON 50, 51.

3 units, Spr (Sweeney, J)

IPER 250. Ecological Principles for Environmental Problem Solving
For joint degree M.S. students in Law, Business, or Medicine, or IPER Ph.D. or other graduate students with limited biology background. Topics include field methods, climate, biogeography, biogeochemical cycles, physiology, population genetics, and environmental ethics.

3 units, Spr (Staff)

IPER 260. The Social Sciences and Environmental Problem Solving
For students with little background in the social sciences interested in incorporating them into their research. Focus is on the contribution that the social sciences of international relations, political science, anthropology, and sociology make to environmental problem solving. Case studies from international regime building, inter-agency politics, organizational behavior, and cultural dynamics.

2-3 units, not given this year

IPER 270. Graduate Practicum in Environment and Resources
Opportunity for 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 (Daily, G), Win (Daily, G), Spr (Daily, G), Sum (Daily, G)

IPER 300. Earth Sciences Seminar
(Crosslisted in each department in the School of Earth Sciences.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Two faculty members present work at each meeting. May be repeated for credit.

1 unit, Aut (Harris, J)

IPER 310. Environmental Forum Seminar
Required IPER core course for first year Ph.D. and joint and dual M.S. students. Conceptual framework, analytical approaches, validity of conclusions from an interdisciplinary perspective, and alternative approaches. Autumn Quarter: participants attend the Woods Institute's Environmental Forum series or other seminar on campus selected by faculty and students. Winter Quarter: guest Stanford faculty discuss environment and sustainability research. May be repeated for credit. Prerequisite for non-IPER graduate students: application.

1-2 units, Aut (Schneider, S; Root, T), Win (Oleson, K)

IPER 320. Designing Environmental Research
Required IPER core course restricted to first year 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.

4 units, Win (Davis, J; Scruggs, C)

IPER 330. Research Approaches for Environmental Problem Solving
Required IPER core course restricted to first year IPER Ph.D. students. How to identify good research questions and implement interdisciplinary research in environment and resources. Student presentations of work in progress; peer critique of written work. Corequisite: 398 with the faculty member chosen to explore a possible dissertation topic.

3 units, Spr (Ortolano, L; Schaffer, H)

IPER 333. Water Policy Colloquium
(Same as CEE 333, GES 333.) Student-organized interdisciplinary colloquium. Creation, implementation, and analysis of policy affecting the use and management of water resources. Weekly speakers from academia and local, state, national, and international agencies and organizations.

1 unit, Spr (Freyberg, D)

IPER 335. Environmental Science for Managers and Policy Makers
(Same as LAW 608, OIT 338.) Core course for joint J.D., M.B.A., or M.D. with M.S. in Environment and Resources; open to first-year Law and GSB students; recommended for those who plan to apply to the joint degree program. Fundamentals of earth and environmental science, spreadsheet modeling, optimization, and Monte Carlo simulation. Applications in resource management and environmental policy.

4 units, Win (Plambeck, E; Daily, G; Field, C; Masters, G; Palumbi, S)

IPER 339. Environmental Entrepreneurship
(Same as GSBGEN 339.) The potential of markets for solving environmental problems, and for environmental entrepreneurs to invent those solutions. How to apply business principles of finance, marketing, economics, operations, and accounting to the provision of environmental goods and services. Case studies include innovation in materials and energy, conservation of land and wildlife, environmental product differentiation and supply chain management, investing under regulatory risk, and partnership between nonprofit and for-profit organizations. Guest speakers include environmental entrepreneurs, venture capitalists, corporate executives, and nonprofit leaders. Students develop their own business plans in environmental entrepreneurship.

4 units, Aut (Plambeck, E)

IPER 398. Directed Individual Study in Environment and Resources
Under supervision of an IPER faculty member on a subject of mutual interest.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPER 399. Directed Research in Environment and Resources
For advanced graduate students.

1-9 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPER 410. Ph.D. Qualifying Tutorial
For Ph.D. students only.

1 unit, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

IPER 460. Proposal Writing Tutorial
Practical training in grant writing methods. Students draft research proposals relevant to individual interests with supervision from IPER faculty.

1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

IPER 480. Dissertation Writing Tutorial in Environment and Resources
For students who have completed the oral qualifying examination.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INTERDISCIPLINARY STUDIES IN HUMANITIES (HUMNTIES) COURSES

For information on undergraduate and graduate programs in Interdisciplinary Studies in Humanities, see the "Interdisciplinary Studies in Humanities" section of this bulletin.

UNDERGRADUATE COURSES IN INTERDISCIPLINARY STUDIES IN HUMANITIES

HUMNTIES 100. Text and Context in Humanities
Required of students in the Humanities Honors Program. Introduction to Interdisciplinary Studies in Humanities through the study and application of theoretical approaches to major texts. Textual analysis and writing assignments to prepare students to write honors essays. GER:DB-Hum

3 units, Win (Freidin, G; Staveley, A)

HUMNTIES 161. Texts in History: Classics from Greece to Rome
(Same as CLASSGEN 163, DRAMA 161R.) Priority to students in the Humanities honors program. Ancient texts situated in their intellectual and cultural contexts. Readings include Homer's *Iliad* and *Odyssey*, plays of Aeschylus, Sophocles' *Antigone*, Euripides' *Medea*, Thucydides *Peloponnesian War*, Plato's *Symposium*, Aristotle's *Poetics*, Virgil's *Aeneid*, Seneca's *Trojan Women* and *Agamemnon*, and Augustine's *On Christian Doctrine*. GER:DB-Hum

5 units, Win (Rehm, R)

HUMNTIES 162. Texts in History: Medieval to Early Modern
(Same as ENGLISH 184C.) Priority to students in the Humanities honors program. The impact of change from the Middle Ages to the early modern world; how historical pressures challenged conceptions of artistic form, self, divine, and the physical universe. Interdisciplinary methods of interpretation. Texts include: Aristotle, On the Soul; Attar,The Conference of the Birds; Dante, nferno; Chaucer, Canterbury Tales; Christine de Pizan, The Book of the City of Ladies; Letters of Columbus; Machiavelli, The Prince; Luther, The Bondage of the Will; Montaigne, Essays; Marlowe, Doctor Faustus; poems by John Donne and Lady Mary Wroth; Shakespeare, Othello; and works of art. GER:DB-Hum

5 units, Spr (Brooks, H)

HUMNTIES 163. Texts in History: Enlightenment to the Modern
(Same as ENGLISH 184D.) Priority to students in the Humanities honors program and English majors. The relationship between intellectual, political, and cultural history, and imaginative literature in the modern period. Rousseau, Kant, Austen, Mary Wollstonecraft, Marx, Dostoevsky, Nietzsche, Mill, Virginia Woolf, T.S. Eliot, Beckett. GER:DB-Hum

5 units, Aut (Staveley, A)

HUMNTIES 170. Media Studies Internship
Practical experience working with a film or media company for six to eight weeks. Students make arrangements with companies individually and receive the consent of the director of the Humanities honors program. Credit awarded for submitting a paper after completing the internship, focused on a topic relevant to the student's studies.

2-3 units, Aut (Freidin, G), Win (Freidin, G), Spr (Freidin, G), Sum (Staff)

HUMNTIES 175. Individual Work

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HUMNTIES 181. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

HUMNTIES 192G. Musical Shakespeare: Theater, Song, Opera, and Film
(Same as MUSIC 148, 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*. May be repeated for credit. Pre- or corequisite: 23.

4-5 units, Win (Grey, T)

HUMNTIES 193H. The Art of the Movies: Story, Drama, and Image
(Same as PHIL 193H.) 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.

4 units, Aut (Hills, D)

HUMNTIES 196S. Contemporary Religious Reflection
(Same as RELIGST 240, RELIGST 340.) Focus is on normative and prescriptive proposals by recent and contemporary philosophers and theologians, as opposed to the domination of Religious Studies by textual, historical, cultural, and other largely descriptive and interpretive approaches. Do such normative and prescriptive proposals belong in the academy? Has Religious Studies exorcised its theological nimbus only to find contemporary religious reflection reappearing elsewhere in the university?

3-5 units, Aut (Sockness, B)

HUMNTIES 197F. Tolstoy's Anna Karenina in Dialogue with Contemporary Philosophical, Social, and Ethical Thought
(Same as SLAVGEN 190, SLAVGEN 290.) Themes: institutions of the family and gender; debate about the female body, church, and religion; the decline of privilege and the rise of capital and industry; the meaning of art and the artist; conflicts of law and custom, country and city, andnationalism and cosmopolitanism; and the ascetic rejection of the world. Authors include Marx, Mill, Nietzsche, Dostoevsky, Weber, and Freud. GER:DB-Hum, DB-Hum, EC-EthicReas

3-4 units, Spr (Freidin, G)

HUMNTIES 198J. Digital Humanities: Beyond the Book
(Same as ENGLISH 153H.) How electronic texts, literary databases, computers, and digital corpora offer unique ways of reading, analyzing, and understanding literature. Intellectual and philosophical problems associated with an objective methodology within a traditionally subjective discipline. GER:DB-Hum

5 units, Aut (Jockers, M)

HUMNTIES 198W. Digital Humanities Workshop
(Same as COMPLIT 198.) Post-print models of research and scholarship in humanities fields. Toolkits being employed in such work from wikis to interactive media to virtual worlds; and theories and practices in the digital humanities field. Focus is on student projects.

4 units, Spr (Schnapp, J)

HUMNTIES 199A. Honors Essay Writing Workshop
Two quarter sequence. Students discuss progress on research and writing the senior honors essay. Required for seniors in the Humanities honors program.

1 unit, Aut (Batuman, E)

HUMNTIES 199B. Honors Essay Writing Workshop
Two quarter sequence. Students discuss progress on research and writing the senior honors essay. Required for seniors in the Humanities honors program.

1 unit, Win (Batuman, E)

HUMNTIES 200A. Research Proposal
Preliminary planning and study. Student drafts a proposal in Winter Quarter of the junior year to submit to the committee in charge for suggestions regarding focus and bibliography. After revisions, the student resubmits a fully developed proposal to the committee for additional comment and/or final approval. 60 hours over two quarters are expected of students developing their essay proposals for 2 units, usually 1 unit each in Winter and Spring of the junior year. Students usually make revisions of some kind in either scope or formulation of the topic. Students overseas submit proposals and receive feedback by fax or email. (WIM)

1-2 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMNTIES 200B. Senior Research
Regular meetings with tutor (thesis adviser). Prerequisite: 200A. WIM

1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

HUMNTIES 200C. Senior Research
Regular meetings with tutor; submission of complete first draft at least two weeks before final deadline. Prerequisite: 200B.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HUMNTIES 201. Digital Humanities Practicum
For Humanities majors concentrating in digital humanities. Work related to the honors thesis under the supervision of a Stanford faculty or staff member usually affiliated with the Stanford Humanities Lab. Must be approved by the Director of Interdisciplinary Studies in Humanities.

2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

GRADUATE COURSES IN INTERDISCIPLINARY STUDIES IN HUMANITIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

HUMNTIES 275. Individual Work

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

HUMNTIES 298. Graduate Program in Humanities Symposium
Required of GPH doctoral and master's students. Participation in the student-organized symposium; presentation of a paper informed by texts addressed in GPH seminars.

1-3 units, Spr (Freidin, G)

HUMNTIES 299. Interdisciplinary Teaching
For doctoral students in the GPH. Supervised interdisciplinary teaching to satisfy the program teaching requirement.

1-2 units, Aut (Freidin, G), Win (Freidin, G), Spr (Freidin, G)

HUMNTIES 301. The Graduate Student and Faculty Colloquium: Mimesis and History
Required for M.A. and Ph.D. students in the Graduate Program in Humanities who have not yet completed the course requirements for the program. May be repeated for credit.

1 unit, Aut (Staff), Win (Staff), Spr (Freidin, G)

HUMNTIES 321. Classical Seminar: Origins of Political Thought
(Same as CLASSHIS 133, CLASSHIS 333, 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.

5 units, Win (Ober, J)

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, Spr (Buc, P)

HUMNTIES 323. Renaissance/Early Modern Seminar
(Same as SPANLIT 323.) Focus is on this period as it records the impact of major historical forces: the advent of printing; the reappropriation of classical thought; the expansion of trade; revolutions in religion; the exploration of uncharted realms of the self, the world, and the heavens; and the rise of historiography. Authors: Attar, de Pizan, Pico della Mirandola, Columbus, De Las Casas, Machiavelli, Luther, Montaigne, Marlowe, Donne, Shakespeare, and Galileo.

3-5 units, Spr (Barletta, V)

HUMNTIES 324. Enlightenment Seminar
(Same as HISTORY 334.) 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.

3-5 units, Win (Baker, K)

HUMNTIES 325. Modern Seminar
(Same as PHIL 325.) Modern anxieties about the place of human concerns within a disenchanted natural world, focusing on texts of philosophy, social theory, and imaginative literature. Cultural and psychological consequences of perceived decline in and threats to religious faith. Authors may include Schiller, Schopenhauer, Coleridge, Kierkegaard, Marx, Baudelaire, Darwin, Nietzsche, Weber, Eliot, Woolf, Sartre, and Camus.

3-5 units, Spr (Anderson, L)

INTERNATIONAL POLICY STUDIES (IPS) COURSES

For information on graduate programs in International Policy Studies, see the "International Policy Studies" section of this bulletin.

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; Stedman, S)

IPS 202. Topics in International Macroeconomics
Topics: standard theories of open economy macroeconomics, exchange rate and stabilization policies, the economics of monetary unification and the European Monetary Union, and emerging markets financial and currency crises.

5 units, Aut (Aturupane, C)

IPS 203. Issues in International Economics
Topics in international trade and international trade policy: trade and growth, regionalism versus multilateralism, the political economy of trade policy, trade and labor, trade and the environment, and trade policies for developing and transition economies. Prerequisite: ECON 165.

5 units, Win (Aturupane, C)

IPS 204A. Microeconomics
(Same as PUBLPOL 201A.) 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.

4 units, Aut (Bulow, J)

IPS 204B. Cost-Benefit Analysis and Evaluation
(Same as PUBLPOL 201B.) Ex ante and ex post evaluation of projects and policies, value of life calculations, and welfare evaluation of public and private decisions. Welfare measures; tradeoffs between efficiency and equity. Second best. Behavioral economics: psychological mechanisms behind static choice, intertemporal choice, choice under risk and uncertainty, choice in social situations, and hedonics. Statistical decision theory. Use of incentives in implementing policies. 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.
4 units, Spr (Kessler, D)

IPS 205A. Principles of Research Design and Analysis: Methods
(Same as PUBLPOL 203A.) 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.
2 units, Aut (Hensler, D)

IPS 205B. Principles of Research Design and Analysis: Tools
(Same as PUBLPOL 203B, 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 205C. Foundations of Statistical Inference
(Same as PUBLPOL 203C, 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 via computer exercises using statistical packages; how to analyze empirical studies, conduct empirical research, and cross-examine or work with statistical experts.
2 units, Aut (Strnad, J)

IPS 206A. Politics and Collective Action
(Same as POLISCI 331S, PUBLPOL 204A.) 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. Applicable to collective action problems in any realm, but focus is on practical examples from environmental management.
4 units, Spr (Oleson, K)

IPS 206B. Organizations
(Same as PUBLPOL 204B.) Policy reform and organizational resistance. Organizations include government and other bureaucracies such as not-for-profit schools, universities, hospitals, international organizations, political parties, and agencies. Hubris and policy making, including pathologies of decision making and planning, abuse of intelligence, biased information, overselling to publics, lack of knowledge about context, and unintended consequences.
4 units, Spr (Stedman, S; Eden, L)

IPS 207. Governance, Growth, 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 governance, and relationships between it and growth, development, investment, human capital, and outcomes such as poverty and income inequality. The cultural, economic, and political determinants of governance; policy implications. Prerequisites: ECON 50 and 102B.
5 units, Spr (Aturupane, C)

IPS 207A. Judgment and Decision Making
(Same as PUBLPOL 205A. 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. Support theory. 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 205B.) 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 136S, PUBLPOL 207.) 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 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.
5 units, Aut, Win (Sprague, M; Oleson, K)

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.
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.
5 units, Win (Morris, E)

IPS 219. The Role of Intelligence in U.S. Foreign Policy
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.
5 units, Aut (Hansen, K)

IPS 220. The United States, Europe, and the World
Different approaches toward sovereignty, the debate on unilateralism and multilateralism, and hard and soft power. Case studies on Iraq, the Israeli-Palestinian conflict, and Iran.The transatlantic security relationship focusing on nonproliferation, the fight against terrorism, democracy building, the development of a EU foreign and security policy and European Defense Force, the changing role of NATO,

and Russia and the Balkans. U.S.-EU trade, investment, and economic issues. Global governance topics include the world trading system, global warming, and the International Criminal Court.

5 units, Spr (Staff)

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.

5 units, Win (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, Spr (Staff)

IPS 222. Economic Development

Focus is on development policies. Agriculture, industrialization, role of financial development, income distribution, human resource development, international relations, and economic aid.

5 units, Spr (Staff)

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 (Stoner-Weiss, K; McFaul, M)

IPS 231. Law, Democracy, and Development

(Same as LAW 302.) How do growing efforts of national agencies, multilateral development organizations, and NGOs foster economic growth, the rule of law, and democracy around the globe? The relationship between regime type and peace and prosperity by drawing on international legal scholarship, democratization studies, international relations theory, and development economics. Actual and potential international efforts at state building, development aid, and democracy promotion.

3 units, Aut (Staff)

IPS 232. Law and Policy of the European Union

(Same as LAW 539.) European legal and institutional integration, the nature and sources of EU law, the evolution of the single market, and the building of a supranational judicial system. General principles of EU law, the scope of Community powers and their application in the national legal systems of the member states, EU legislation and adjudication, the four freedoms of the single market, corporate and competition policy, and human rights law. U.S.-EU trade and anti-trust issues, cooperation in defense, development assistance, promotion of democracy, and relations in the context of the new challenges to global governance.

4 units, Win (Morningstar, R; Magen, A)

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 (Blacker, C; Crenshaw, M)

IPS 243. The History, Science, Technology, and Politics of Missile Defense

The science and engineering of anti-ballistic missile defense systems in the context of political decisions, including the ABM Treaty, Reagan's Strategic Defense Initiative, and current policy debates.

3-5 units, Spr (Holloway, D; Postol, T)

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, Win (Armacost, M)

IPS 250. International Conflict: Management and Resolution

(Same as 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.

5 units, Win (Weiner, A; Holloway, D)

IPS 260. Halving World Hunger by 2015: A Feasible Goal?

5 units, not given this year

IPS 261. Pathways Out of Rural Poverty

(Same as EARTHSYS 152, EARTHSYS 252, ECON 155B.) Determinants of rural poverty and historical pathways that have led the rural poor out of it. Policy perspectives: the macro level concerning overall economic growth and structural transformation; the sectoral level focusing on the role of agriculture in poverty reduction; and the household level focusing on individual characteristics and asset holdings, including human capital. The impact of globalization on pathways out of poverty and on agriculture and structural transformation in developing countries. Prerequisite: ECON 106 or 118 or EARTHSYS 180.

5 units, Spr (Timmer, C)

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, Win (Staff)

IPS 263. Energy Cooperation in the Western Hemisphere

(Same as EARTHSYS 132, EARTHSYS 232.) 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, Spr (O'Keefe, T)

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. Public Policy Colloquium

Presentations of techniques and applications of policy analysis by students, faculty, and guests, including policy analysis practitioners. May be repeated for credit.

1 unit, Aut (Stedman, S)

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)

INTERNATIONAL RELATIONS (INTNLREL) COURSES

For information on undergraduate programs in International Relations, including courses applicable to Comparative Political and Historical Analysis (CPHA), Comparative Culture and Society (CCAS), and Comparative and International Political Economy (CIPE) functional specifications, see the "International Relations" section of this bulletin.

UNDERGRADUATE COURSES IN INTERNATIONAL RELATIONS

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 (Stoner-Weiss, K; McFaul, M)

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, Spr (Drori, G)

INTNLREL 136R. Introduction to Global Justice
(Same as ETHICSOC 136R, POLISCI 136R, POLISCI 336.) Recent work in political theory on the ethics of international relations. Topics include human rights, global economic justice, and the problem of global poverty.
5 units, Spr (Staff)

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 140B. Theories of International Law
Competing theories of international law, including approaches based on natural law, positivism, the Grotian tradition, realism, rational institutionalism, liberalism, social construction, and critical theory; evaluations based upon explanatory power, parsimony, and prescriptive implications. How international legal arguments are made through each theoretical perspective. Primary and secondary materials by international law theorists and political scientists. Term paper.
5 units, Spr (Steinberg, R)

INTNLREL 140C. The U.S., U.N. 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 150. The Arab-Palestinian Minority in Israeli Society
The ethnic and religious composition of Israel. Recent challenges to the primacy of the Jewish core of Israeli society; the status of the Arab-Palestinian minority in Israel. Issues include: the status of the Arabic language; the right to vote and run for office; allocation of state funds to minority projects and local governments; representation in decision making institutions; military service; and the Arab educational system. Political and legal dimensions of the minority status of Arab-Palestinians; impact of domestic Jewish/Palestinian politics on the Israeli/Arab international conflict.
5 units, Aut (Holzman-Gazit, Y)

INTNLREL 155. Counter Terrorism
Practical and theoretical perspectives. Topics include: coping with the threat on an offensive, preemptive, and defensive level; intelligence gathering; deterrence; and the challenges of international cooperation. Targeted killings, the boomerang effect, the democratic dilemma of counter-terrorism, and how to balance military measures with counter-motivation activities in preventing and thwarting terrorism.
5 units, Aut (Staff)

INTNLREL 156. Modern Terrorist Strategies
The nature and characteristics of the terrorism phenomenon and the modus operandi of international terrorist organizations, including Al Qaeda and its proxies. The definition of terrorism, terrorism as a

means of political violence, the suicide attack phenomenon, psychological warfare, media and public opinion, and terrorism and public resilience.
5 units, Win (Staff)

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.
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.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

INTNLREL 199. Honors Research: Democracy, Development, and the Rule of Law in Developing Countries
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, Spr (Teitelbaum, J)

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, Spr (Teitelbaum, J)

OVERSEAS STUDIES COURSES IN INTERNATIONAL RELATIONS

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING INTERNATIONAL RELATIONS COURSES

OSPBEIJ 11. Chinese Society in the Post-Mao Era
5 units, Aut (Walder, A)

OSPBEIJ 19. Population and Society in East Asia
4 units, Spr (Zhou, Y)

OSPBEIJ 24. China's Economic Development
5 units, Spr (Rozelle, S)

OSPBEIJ 43. Constitutional and Legal Reforms in Contemporary China
5 units, Spr (Wang, X)

OSPBEIJ 46. Introduction to Chinese Economy
5 units, Aut (Chen, D)

OSPBEIJ 47. Institutional Change in Reform China
5 units, Aut (Oi, J)

OSPBEIJ 66. Essentials of China's Criminal Justice System
5 units, Aut (Wang, S)

BERLIN INTERNATIONAL RELATIONS COURSES

OSPBER 15. Shifting Alliances? The European Union and the U.S.
4-5 units, Win (Brueckner, U)

OSPBER 115X. The German Economy: Past and Present
4-5 units, Aut (Klein, I)

OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU
4-5 units, Aut (Brueckner, U)

OSPBER 161X. The German Economy in the Age of Globalization
4-5 units, Win (Klein, I)

OSPBER 174. Sports, Culture, and Gender in Comparative Perspective
5 units, Spr (Junghanns, W)

OSPBER 177A. Culture and Politics in Modern Germany
4-5 units, Aut (Kramer, K)

FLORENCE INTERNATIONAL RELATIONS COURSES

OSPFLOR 46. International Monetary Economics
5 units, Spr (Cifarelli, G)

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema
5 units, Win (Campani, E)

OSPFLOR 61. Europe and U.S. Foreign Policy
5 units, Aut (Schultz, K)

OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
5 units, Aut (Morlino, L)

OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon
5 units, Win (Allam, K)

OSPFLOR 97. Human Rights, Justice and Terrorism: Is the World Community Prepared to Prevent a Catastrophe?
4 units, Spr (Vierucci, L)

OSPFLOR 106V. Italy: From Agrarian to Postindustrial Society
4 units, Aut (Mammarella, G)

KYOTO INTERNATIONAL RELATIONS COURSES

OSPKYOTO 24. Japan in Contemporary International Affairs
5 units, Spr (Horvat, A)

OSPKYOTO 215X. The Political Economy of Japan
4-5 units, Spr (Hayashi, T)

MADRID INTERNATIONAL RELATIONS COURSES

OSPMADRD 24. Spain and Africa through the Ages
3 units, Spr (Surwillo, L)

OSPMADRD 25. European Legal History
5 units, Aut (Herzog, T)

OSPMADRD 42. A European Model of Democracy: The Case of Spain
5 units, Win (Bobillo de la Peña, F)

MOSCOW INTERNATIONAL RELATIONS COURSES

OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia
5 units, Aut (Mau, V)

OSPMOSC 72. Space, Politics, and Modernity in Russia
5 units, Aut (Medvedev, S)

OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration
5 units, Aut (Bratersky, M; Kortunov, S)

OSPMOSC 75. Soviet and Post-Soviet Leaders
5 units, Aut (Weiner, A)

OXFORD INTERNATIONAL RELATIONS COURSES

OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective
4-5 units, Spr (McMahon, R)

OSPOXFRD 35. Modern UK and European Government and Politics
4-5 units, Aut (Cappocia, G)

OSPOXFRD 62. Heretics to Headscarves
5 units, Win (Rakove, J)

PARIS INTERNATIONAL RELATIONS COURSES

OSPPARIS 33. The Economics of Climate Change: Policies in Theory and Practice in the EU and the U.S.
5 units, Spr (de Perthuis, C; Keppler, J; Leguet, B)

OSPPARIS 57. Human Rights in Comparative Perspective
4-5 units, Spr (Boussaguet, L)

OSPPARIS 81. France During the Second World War: Between History and Memory
5 units, Win (Virgili, F)

OSPPARIS 91. Globalization and Its Effect on France and the European Union
5 units, Win (Le Cacheux, J; Laurent, E)

OSPPARIS 122X. Challenges of Integration in the European Union
4-5 units, Spr (Strudel, S)

OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead
5 units, Aut (Le Cacheux, J; Laurent, E)

OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time
4-5 units, Win (Fessler, J)

OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France
4-5 units, Aut (Muxel, A; Strudel, S)

SANTIAGO INTERNATIONAL RELATIONS COURSES

OSPSANTG 68. The Emergence of Nations in Latin America
4-5 units, Aut (Jaksic, I), Spr (Jaksic, I)

OSPSANTG 104X. Modernization and Culture in Latin America
5 units, Aut (Subercaseaux, B)

OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century
5 units, Spr (Correa, G)

OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies
5 units, Spr (Munoz, O)

OSPSANTG 129X. Latin America in the International System
4-5 units, Win (Fuentes, C)

OSPSANTG 130X. Latin American Economies in Transition
5 units, Aut (Briones, I)

OSPSANTG 141X. Politics and Culture in Chile
5 units, Spr (Subercaseaux, B)

OSPSANTG 160X. Latin America in the International Economy
5 units, Win (Staff)

OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective
5 units, Aut (Micco, S)

INTRODUCTION TO THE HUMANITIES (IHUM) COURSES

For information on Introduction to the Humanities, see the "Introduction to the Humanities" section of this bulletin.

UNDERGRADUATE COURSES IN INTRODUCTION TO THE HUMANITIES

IHUM 2. Epic Journeys, Modern Quests
First of a twoquarter sequence. Great religious, philosophical, and literary texts that have addressed timeless questions about human identity and the meaning of human life. Focus is on the epic tradition in the ancient and classical worlds. Compares conceptions of the afterlife. How traditions about the afterlife are created. GER:IHUM-2
4 units, Win (Harrison, R; Galvez, M)

IHUM 3. Epic Journeys, Modern Quests
Second of a two quarter sequence. Great religious, philosophical, and literary texts that have addressed timeless questions about human identity and the meaning of human life. Focus is on the transformations or abandonment of the epic tradition in modernity. Compares conceptions of the afterlife. How traditions about the afterlife are appropriated. The diminished importance of the dead and increased emphasis on the power of the living in literary genres. GER:IHUM-3
4 units, Spr (Harrison, R; Apostolides, J)

IHUM 4A. Mass Violence from Crusades to Genocides
First of a two quarter sequence. The evolution, varieties, causes, and logic of mass violence in premodern history; how mass violence shaped historical trends. What accounts for the persistence of mass violence in history? Do religions and ethnicity foment or restrain mass violence? Is there a common pattern of mass violence throughout the centuries? Geographic focus is Europe; comparisons with societies which the Europeans encountered such as the Aztec empire, the Islamic world, and the African colonies. GER:IHUM-2
4 units, Win (Buc, P)

IHUM 4B. Mass Violence from Crusades to Genocides
Second of a two quarter sequence. The evolution, varieties, causes, and logic of mass violence in modern history; how mass violence shaped historical trends. What accounts for the persistence of mass violence in history? Do religions, ethnicity, and modernity foment or restrain mass violence? Is there a common pattern of mass violence throughout the centuries? Geographic focus is Europe; comparisons with societies which the Europeans encountered such as the Aztec empire, the Islamic world, and the African colonies. GER:IHUM-3
4 units, Spr (Weiner, A)

IHUM 6A. World History of Science
Second of a two quarter sequence. The broad sweep of global science, from the Scientific Revolution throught recent triumphs in the physical and life sciences. The historicity of life and how science transforms and is transformed by human engagements with technology, religion, art, politics, and moral values. GER:IHUM-2
4 units, Win (Proctor, R)

IHUM 6B. World History of Science
First of a two quarter sequence. The broad sweep of global science, from the prehistoric roots of the oldest known technologies through the Scientific Revolution. The historicity of life and how science transforms and is transformed by human engagements with technology, religion, art, politics, and moral values. GER:IHUM-3
4 units, Spr (Proctor, R)

IHUM 7A. Rebellious Daughters and Filial Sons of the Chinese Family: Present and Past
First in a two quarter sequence. The family in its enduring role in shaping members of a community and citizens of society. The Chinese family as a case study. How family has been revolted against, broken up, critiqued, and transformed through social and political changes. The authority of the father, care of the mother, supportive or antagonistic relations of siblings, and the extension of these relations in kinship community and society. How notions of love, emotion, and gender play into the formation of the family and how family connects with interpersonal and social relations. GER:IHUM-2
4 units, Win (Wang, B)

IHUM 7B. Rebellious Daughters and Filial Sons of the Chinese Family: Present and Past
Second in a two quarter sequence. The family in its enduring role in shaping members of a community and citizens of society. The Chinese family as a case study. How family has been revolted against, broken up, critiqued, and transformed through social and political changes. The stern authority of the father, nourishing care of the mother, supportive or antagonistic relations of siblings, and the extension of these relations in kinship community and society. How notions of love, emotion, and gender play into the formation of the family and how family connects with interpersonal and social relations. GER:IHUM-3
4 units, Spr (Zhou, Y)

IHUM 10A. Humanistic Perspectives on Science
First in a two quarter sequence. A humanistic perspective views science itself as an essential part of human culture and explores the many relationships between scientific activity and religion, philosophy, society, politics, and the arts. Exploration of these relationships from a philosophical point of view, across a large part of the development of Western science from ancient Greece and the medieval period, through the scientific revolution of the 16th and 17th centuries, and up to recent times. GER:IHUM-2
4 units, Win (Friedman, M)

IHUM 10B. Humanistic Perspectives on Science
Second in a two quarter sequence. A humanistic perspective views science itself as an essential part of human culture and explores the many relationships between scientific activity and religion, philosophy, society, politics, and the arts. Exploration of these relationships from a philosophical point of view, across a large part of the development of Western science from ancient Greece and the medieval period, through the scientific revolution of the 16th and 17th centuries, and up to recent times. GER:IHUM-3
4 units, Spr (Longino, H)

IHUM 11A. Origins of the Modern World: Europe and Latin America
First in a two quarter sequence. 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 shocks of social revolution and authoritarianism throughout Latin America. The creative/destructive tensions inherent in this long transformation. GER:IHUM-2
4 units, Win (Como, D)

IHUM 11B. Origins of the Modern World: Europe and Latin America
Second in a two quarter sequence. 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 shocks of social revolution and authoritarianism throughout Latin America. The creative/destructive tensions inherent in this long transformation. GER:IHUM-3
4 units, Spr (Frank, Z)

IHUM 23A. The Fate of Reason
Two quarter sequence. The historical fate of Socrates' proposal that only reason can provide answers to questions of what to believe and how to act. The fate of reason in cultural contexts including medieval Christian, Islamic, and Jewish. Themes include free will, personal identity, the authority of morality, and the tension between reason as power for improving life and as insufficient means for reaching important truths. GER:IHUM-2
4 units, not given this year

IHUM 23B. The Fate of Reason
Two quarter sequence. The historical fate of Socrates' proposal that only reason can provide answers to questions of what to believe and how to act. The fate of reason in cultural contexts including medieval Christian, Islamic, and Jewish. Themes include free will, personal identity, the authority of morality, and the tension between reason as power for improving life and as insufficient means for reaching important truths. GER:IHUM-3
4 units, not given this year

IHUM 25A. Art and Ideas
First in a two quarter sequence. Art forms of theatre and dance explore fundamental questions about cultural, political and aesthetic issues surrounding the use of the body as an art medium. Examples of global performance from 19th to 21st centuries ranging from Romantic ballet to athletic experimental theatre. History and evolution of representing life through performance in a range of live and digital examples. GER:IHUM-2
4 units, Win (Ross, J; Rayner, A)

IHUM 25B. Art and Ideas
Second in a two quarter sequence. Art forms of theatre and danceexplore fundamental questions about cultural, political and aesthetic issues surrounding the use of the body as an art medium. Global performance from 19th to 21st centuries ranging from Romantic ballet to athletic experimental theatre. History and evolution of representing life through performance in a range of live and digital examples. GER:IHUM-3
4 units, Spr (Rayner, A; Ross, J)

IHUM 31A. Ancient Empires
First in a wo quarter sequence. A decisive place and period in world history: the Mediterranean basin from 800 B.C.E. to 400 C.E. Great empires (Assyria, Persia, Macedonia, and Rome) were carved out in war and changed the course of human development. Why did these empires arise when and where they did, how did they work, and what is their legacy? Their economic, religious, and artistic achievements balanced against genocide, enslavement, and warfare using evidence from ancient literature and archaeology, and tracing the roles of religion, property, and freedom. What they mean for the world today. GER:IHUM-2
4 units, Win (Morris, I)

IHUM 31B. Ancient Empires
Second in a two quarter sequence. A decisive place and period in world history: the Mediterranean basin from 800 B.C.E. to 400 C.E. Great empires (Assyria, Persia, Macedonia, and Rome) were carved out in war and changed the course of human development. Why did these empires arise when and where they did, how did they work, and what is their legacy? Their economic, religious, and artistic achievements balanced against genocide, enslavement, and warfare using evidence from ancient literature and archaeology, and tracing the roles of religion, property, and freedom. What they mean for the world today. GER:IHUM-3
4 units, Spr (Scheidel, W)

IHUM 34A. A Life of Contemplation or Action? Debates in Western Literature and Philosophy
First in a two quarter sequence. Literary treatments of the debate over the active versus the contemplative life from the classical to the modern era. Changing literary, historical and philosophical contexts. 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. Literary treatments of the debate over the active versus the contemplative life from the classical to the modern era. Changing literary, historical and philosophical contexts. 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. The ancient Mediterranean world was as consumed with questions about the nature of human society and human existence as is present-day society. Sources include influential literary texts from Greece and Rome, and from other

cultures in the Mediterranean and the Near East, organized by literary genre. The origins of such genres. 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. The ancient Mediterranean world was as consumed with questions about the nature of human society and human existence as is present-day society. Sources include influential literary texts from Greece and Rome, and from other cultures in the Mediterranean and the Near East, organized by literary genre. The origins of such genres. GER:IHUM-3
4 units, Spr (Staff)

IHUM 40A. World Archaeology and Global Heritage
First in a two quarter sequence. The impact of the past on the present, and of the present on the past: the role of the past in contemporary society, and of present-day archaeological research, management, and conservation in approaching the past. Topics include debates about the peopling of the New World, religious conflicts over heritage sites, and archaeology's roles in heritage and conflicts. Sources include archaeological sites, landscapes, architecture, objects, literary works, religious texts, films, political essays, and scientific articles. GER:IHUM-2
4 units, Win (Hodder, I)

IHUM 40B. World Archaeology and Global Heritage
Second in a two quarter sequence. The impact of the past on the present, and of the present on the past: the role of the past in contemporary society, and of present-day archaeological research, management, and conservation in approaching the past. Topics include debates about the peopling of the New World, religious conflicts over heritage sites, and archaeology's roles in heritage and conflicts. Sources include archaeological sites, landscapes, architecture, objects, literary works, religious texts, films, political essays, and scientific articles. GER:IHUM-3
4 units, Spr (Voss, B)

IHUM 57. Humans and Machines
Shifting boundaries between mechanical and human: how humans interact with machines, and how they may be conceived, designed, and manipulated as machines; how machines in turn reflect upon their human creators. What it means to think of the human body as a machine or as not a machine: what is a machine; what forms can machinery take; what is a living body; what have concepts such as machine, human, alive, and intelligent meant in different times and places; and how have their meanings changed? GER:IHUM-1
4 units, Aut (Lowood, H; Bukatman, S)

IHUM 58. Technological Visions of Utopia
How changes since Thomas More's Utopia was written, including advances in science and technology, have opened new possibilities for the good society. Focus is on works that consider how literary visions of society have evolved with the progress of science and technology. Readings include More and technologically determined visions of the late 20th century. GER:IHUM-1
4 units, Aut (Roberts, E; Robinson, O)

IHUM 58Q. Technology and Utopia: Refining the Vision
Stanford Introductory Seminar. Preference to sophomores. Students read utopian literature more broadly than in IHUM 58 including texts such as Edward Bellamy's Looking Backward and texts that offer greater diversity of vision. The nature of utopia. Students develop their own imaginative visions of the ideal society. Prerequisite: IHUM 58.
3 units, Aut (Robinson, O; Roberts, E)

IHUM 63. Freedom, Equality, Difference
Which freedoms should a just society promote and which should be curtailed for the sake of justice? What equalities properly concern government and how can the achievement of equality be reconciled with respect for freedom? What roles should social and political institutions take in guaranteeing freedom and equality? Focus is on interdisciplinary inquiry including political philosophy, education, literature, history, and law. Abstract ideas and case histories, using one to shed light on the other. GER:IHUM-1
4 units, Aut (Palumbo-Liu, D; Koski, W; Reich, R)

IHUM 64. Journeys
Works spanning 2,300 years, diverse cultural and historical situations, and different forms and genres, which present essential aspects of the journey from birth to death. These texts trace moral, spiritual, and emotional passages within that one great journey, passages that challenge and transform people as they advance toward what poet Thomas Gray called the inevitable hour. GER:IHUM-1
4 units, Aut (Wolff, T; Yearley, L)

IHUM 65. Race and Reunion: American Memory and the Civil War
The place of slavery and the war in American cultural memory; its representation in literature, visual arts, music, high art, popular culture, and film. How the battle shifted from real to imagined locations. How stories told by writers and artists are shaped by memories and narratives of the past. Themes include competing ideas of race and nation, freedom and citizenship, personal and collective identity, and the purpose of literature and the arts. GER:IHUM-1
4 units, Aut (Wolf, B; Fishkin, S)

IHUM 66. Laws and Orders
The roles of law as a vehicle to establish order and as a tool with which customary order can be called into question. How norms may or may not apply equally in different cultural traditions. Five key texts represent watershed moments in the history of law as a force of regulation, order and normalization, but also as a source of emancipation: sometimes law imposes order, but the law can demand that we resist orders as well. GER:IHUM-1
4 units, Aut (Berman, R; Stacy, H)

IHUM 67. Truth and Morality
Investigates whether there is one truth or many; whether truth is in some way relative to particular groups of people, cultures, societies, or traditions in particular places and times; whether, as some philosophers have argued, human beings are not capable of knowing any truth whatsoever. Descriptive truths, the kinds of things physics, chemistry, biology, psychology, and economics claim to reveal, and normative or evaluative truths, the purported truths of morality, values, and rationality. GER:IHUM-1
4 units, Aut (Bobonich, C; Hussain, N)

IHUM 68A. Performing Religion
First in a two quarter sequence. Religion as a process of constructing meaning. Sources include philosophical texts, stories, rituals, dramatic performances, and other forms of religious expression. Historical contingency in the development of ideas and practices. Examples from Hinduism and Islam. GER:IHUM-2
4 units, Win (Hess, L; Bashir, S)

IHUM 68B. Performing Religion
Second in a two quarter sequence. Religion as a process of constructing meaning. Sources include philosophical texts, stories, rituals, dramatic performances, and other forms of religious expression. Historical contingency in the development of ideas and practices. Examples from Judaism and Buddhism. GER:IHUM-3
4 units, Spr (Fonrobert, C; Bielefeldt, C)

ITALIAN GENERAL (ITALGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of Italian. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in Italian, see the "French and Italian" section of this bulletin. For courses in Italian language instruction, see "Italian Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN ITALIAN GENERAL

ITALGEN 41N. Imagining Italy
Stanford Introductory Seminar. Preference to freshmen. Literary responses to Italy by writers in English during the past hundred years

and how they continue to constuct myths of Italy. How these myths have been transformed into commodities in consumer culture, making Italy a profitable fiction. Authors include Hawthorne, Howells, James, Wharton, Forster, Unsworth, Hellenga, and Mayes. GER:DB-Hum

3-4 units, Spr (Springer, C)

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.

3-5 units, Spr (Nathan, V)

ITALGEN 181. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

GRADUATE COURSES IN ITALIAN GENERAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

ITALGEN 204. Love Songs
(Same as FRENGEN 204.) Medieval love lyric in the old Occitan, Italian, middle high German, and Galician-Portuguese traditions, focusing on deictic address, corporeal and metaphysical subjectivity, the female voice, dialogue songs of ambivalent gender, and the modern translation and reception of the troubadour tradition. Poets include Sappho, Bernart de Ventadorn, La Comtessa de Dia, Walther von der Vogelweide, Dante, Petrarch, Pound, Larkin, and Neruda.

3-5 units, Aut (Galvez, M)

ITALGEN 232. Time of Latency: Western Cultures in the Decade After 1945
(Same as COMPLIT 232A, FRENGEN 232.) Retrospective accounts and contemporary experience converge in the description of the decade following 1945 as a period of quietude that seemed to repress an unknown trauma. Goal is to reconstruct the mood of this historical moment and its relationship to the early 21st century. Sources include canonical texts and everyday documents from different national and cultural contexts. Advanced undergrads require consent of instructor.

3-5 units, Aut (Gumbrecht, H)

ITALGEN 238. Futurisms
(Same as ARTHIST 248, COMPLIT 238.) From its foundation in 1909 through WW II, futurism developed into the first truly international cultural-political avant garde. Its aim was the revolutionary transformation of all spheres of life. The movement's manifestations in Italy, Russia, France, Spain, Latin America, and Eastern Europe. Topics: machines and culture; visual poetics and war; futurism's complex ties to bolshevism and fascism. Media: poetry, performance, music, painting, photography, radio, and film. Writers include: Marinetti, Mayakovsky. Visual artists include: Boccioni, Bragaglia, Russolo, Malevich, Lissitzky.

5 units, Win (Schnapp, J; Gough, M)

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, Aut (Schnapp, J)

ITALGEN 288. Decadence and Modernism from Mallarmé to Marinetti
(Same as FRENGEN 288.) How the notion of decadence, initially a term of derision, shapes and underlies the positive terms of symbolism and modernism. Readings include theories of decadence and examples of symbolist and modernist texts that attempt to exorcise decadent demons, such as lust, mysticism, and the retreat into artificiality. Authors include Huysmans, Poe, Mallarmé, Nietzsche, Nordau, d'Annunzio, Valry, Ungaretti, Marinetti, and Breton.

3-5 units, Spr (Wittman, L)

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), Spr (Gumbrecht, H)

OVERSEAS STUDIES COURSES IN ITALIAN GENERAL

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE ITALIAN GENERAL COURSES

OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema

5 units, Win (Campani, E)

OSPFLOR 54. High Renaissance and Maniera

5 units, Spr (Verdon, T)

OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image

4 units, Spr (Campani, E)

OSPFLOR 134F. Modernist Italian Cinema

5 units, Aut (Campani, E)

ITALIAN LANGUAGE (ITALLANG) COURSES

Students who have never studied Italian before should enroll in ITALLANG 1.Students who have had some training in Italian before entering Stanford must take a placement test. Part I (written) of the placement test must be taken online during the summer, followed by Part II (oral), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Completion of ITALLANG 2A, 3, or 5C fulfills the University foreign language requirement. Students may continue with second-year Italian (20, 21, or 21A) or other higher level courses upon recommendation of the coordinator. A grade of 'C' or better is required to enter the next course in a language sequence. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN ITALIAN LANGUAGE

ITALLANG 1. First-Year Italian, First Quarter
All-in-Italian communicative and interactive approach. Emphasis is on the development of authentic discourse in appropriate cultural contexts. Reading and listening to authentic materials, written and oral presentations, and conversational practice. Language lab, multimedia, and online activities. 3 fulfills the University language requirement.
5 units, Aut (Tennen, D), Win (Tempesta, G), Spr (Gelmetti, S)

ITALLANG 1A. Accelerated First-Year Italian, Part A
Completes first-year sequence 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: placement tests or consent of instructor.
5 units, Aut (Baldocchi, M), Win (Cellinese, A)

ITALLANG 2. First-Year Italian, Second Quarter
Continuation of 1. Prerequisite: 2 or equivalent.
5 units, Aut (Cellinese, A), Win (Tennen, D), Spr (Tempesta, G)

ITALLANG 2A. Accelerated First-Year Italian, Part B
Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Italian or a strong background in another Romance language. 2A fulfills the University language requirement. Prerequisite: placement tests and consent of instructor.
5 units, Win (Baldocchi, M), Spr (Cellinese, A)

ITALLANG 3. First-Year Italian, Third Quarter
Continuation of 2. Prerequisite: 2 or equivalent.
5 units, Aut (Tempesta, G), Win (Cellinese, A), Spr (Tennen, D)

ITALLANG 5A. Intensive First-Year Italian, Part A
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.
5 units, Sum (Devine, M)

ITALLANG 5B. Intensive First-Year Italian, Part B
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.
5 units, Sum (Staff)

ITALLANG 5C. Intensive First-Year Italian, Part C
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.
5 units, Sum (Lopez, N)

ITALLANG 20. Intermediate Oral Communication: Italy Today
Second-year conversation based on movie clips, slide shows, and other authentic 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: first-vear Italian or consent of coordinator.
3 units, Aut (Tempesta, G), Win (Tempesta, G), Spr (Tempesta, G)

ITALLANG 21. Second Year Italian, First Quarter
Content-based, integrating culture and language in the development of authentic discourse. Sources include news and film clips, music and audio files, and literary texts. Reading, writing, listening, and speaking competence based on crosscultural understanding. Prerequisite for 21: 2A, 3, 41C, or consent of coordinator.
4 units, Aut (McCarty, A)

ITALLANG 21A. Accelerated Second-Year Italian, Part A
Completes second-year sequence in two rather than three quarters. Prerequisite: 2A, 3, or consent of coordinator.
5 units, Win (Coggeshall, E), Spr (Baldocchi, M)

ITALLANG 22. Second-Year Italian, Second Quarter
Content-based, integrating culture and language in the development of authentic discourse. Sources include news and film clips, music and audio files, and literary texts. Reading, writing, listening, and speaking competence based on crosscultural understanding. Prerequisite for 21: 2A, 3, 41C, or consent of coordinator.
4 units, Win (McCarty, A)

ITALLANG 22A. Accelerated Second-Year Italian, Part B
Continuation of 21A. Satisfies the foreign language requirement for students majoring in International Relations. Prerequisite: 21A or equivalent, or consent of coordinator.
5 units, Aut (Baldocchi, M), Spr (Baldocchi, M)

ITALLANG 23. Second-Year Italian, Third Quarter
Content-based, integrating culture and language in the development of authentic discourse. Sources include news and film clips, music and audio files, and literary texts. Reading, writing, listening, and speaking competence based on crosscultural understanding. Prerequisite for 21: 2A, 3, 41C, or consent of coordinator.
4 units, Spr (McCarty, A)

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 Language Through 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 listening, speaking, conversation, and debate. Prerequisites: second-year Italian and OSPFLOR 66, or consent of coordinator.
3 units, Aut (Cellinese, A)

ITALLANG 102. Advanced Oral Communication: Italian Contemporaty 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 speaking, conversation, and debate. Prerequisites: second-year Italian and OSPFLOR 66, or consent of coordinator.
3 units, Win (Gelmetti, S)

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 OSPFLOR 21F, 22F or 31F, or consent of coordinator.
3 units, Spr (Cellinese, A)

ITALLANG 113. Italian Cultural Studies
Literature, 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 consent of coordinator.
3-4 units, Aut (Gelmetti, S)

ITALLANG 114. Advanced Stylistics and Composition
Goal is proficiency in written and spoken Italian. Literary and non-literary texts with textual and grammatical analysis, oral reports, translations, and weekly writing assignments. Prerequisite: second-year Italian or consent of coordinator.
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-vear Italian or consent of coordinator. WIM
3-4 units, Spr (Baldocchi, M)

ITALLANG 126. Italy and Italians Today
May be repeated once for credit.
2 units, Aut (Coggeshall, E), Win (Coggeshall, E), Spr (Coggeshall, E)

GRADUATE COURSES IN ITALIAN LANGUAGE

For graduate students only.

ITALLANG 50. Reading Italian
Accelerated. For graduate students seeking to meet the University reading requirement for advanced degrees; seniors require consent of instructor. 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, Win (Gelmetti, S)

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, not given this year

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, not given this year

ITALLANG 394. Graduate Studies in Italian Conversation
Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

ITALLANG 395. Graduate Studies in Italian
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES COURSES IN ITALIAN LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE ITALIAN LANGUAGE COURSES

OSPFLOR 21F. Second-Year Italian, First Quarter
4 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 22F. Second-Year Italian, Second Quarter
4 units, Win (Quercioli, F)

OSPFLOR 31F. Advanced Italian Conversation
4 units, Aut (Quercioli, F), Spr (Quercioli, F)

ITALIAN LITERATURE (ITALLIT) COURSES

These courses typically require knowledge of Italian. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in Italian, see the "Italian" section of this bulletin. For courses in Italian language instruction, see "Italian Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN ITALIAN LITERATURE

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 (Webb, H)

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 (Ferri, S)

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 (Springer, C)

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 275. Politics and Religion in Modern Italian Fiction and Film
How do modern Italian fiction and film reflect Italy's 19th-century unification as a nation which coincided with a radical change in the Catholic Church's power? WW I, fascism, postwar reconstruction, the economic miracle, and current disillusionment and their connections to secularization and the search for a modern Italian culture and aesthetic. Authors include d'Annunzio, Borgese, Silone, Calvino, Pasolini, Tabucchi, and Bellocchio.
3-5 units, Win (Wittman, L)

ITALLIT 281. Italian Poetry Across the Ages
Poets include Dante, Cavalcanti, Petrarch, Michelangelo, Marino, Foscolo, Leopardi, Pascoli, Carducci, D'Annunzio, Ungaretti, Montale, Zanzotto, and Magrelli.
3-5 units, Aut (Harrison, R)

ITALLIT 289. Italian Postmodernism
Was there an epochal change in the history of Italian society as in other countries in the course of the 20th century? How should scholars name and describe this new cultural landscape? Multidisciplinary perspective with readings in the history of culture, sociology, and literary and art history. Writers include Eco, Calvino, and Tabucchi. In Italian.
3-5 units, Win (Ceserani, R)

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)

JAPANESE GENERAL (JAPANGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of an Asian language. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For possible future offerings, see http://www.stanford.edu/dept/asianlang/courses/. For information on undergraduate and graduate programs in Japanese and other programs in the Department of Asian Languages, see the "Asian Languages" section of this bulletin. For courses in Japanese language instruction, see "Japanese Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN JAPANESE GENERAL

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, not given this year

JAPANGEN 71N. Language and Gender in Japan: Myths and Reality
Stanford Introductory Seminar. Preference to freshmen. Ideology and practice of gender in the Japanese society as reflected in and created by stylistic choices in the Japanese language. Past and present speech styles of women and men, speech situations, age, class, identities of the individual speakers and their relationships with others. How belief and reality are refracted through mass media and fictional representations. Comparisons with similar phenomena in other cultures. GER:DB-SocSci, EC-Gender
4 units, Spr (Matsumoto, Y)

JAPANGEN 87. 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, Win (Takeuchi, M)

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, Aut (Takeuchi, M)

JAPANGEN 120. Imperial Japan Between East and West: Cultural History of Japanese Imperialism
From the mid 19th century to the present. The emergence of modern Japanese culture and identity in the context of Western aggression and Japan's overseas expansion in Asia. Topics include representations of colonial others in literature and popular culture, construction of national and imperial identity between Asia and the West, and the postwar legacy of Japanese imperialism. Sources include novels, essays, popular culture, film, comics, and woodblock prints.
4 units, Win (Haag, A)

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, WIM
2-4 units, Spr (Reichert, J)

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, Spr (Cook, A)

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.
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 (Takeuchi, M)

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 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.
2-4 units, Spr (Reichert, J)

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. GER:DB-Hum
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, not given this year

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, Spr (Cook, A)

JAPANESE LANGUAGE (JAPANLNG) COURSES

Students registering for the first time in a course must take a placement test if they have had any training in Japanese before entering Stanford. All entering students must take Part I (written and listening) of the placement test online during the summer, followed by Part II (oral and written), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN JAPANESE LANGUAGE

JAPANLNG 1. First-Year Modern Japanese
Foundation in grammar, reading, and composition. 150 Kanji characters introduced.
5 units, Aut (Busbin, K)

JAPANLNG 2. First-Year Modern Japanese
Foundation in grammar, reading, and composition. 150 Kanji characters introduced.
5 units, Win (Busbin, K)

JAPANLNG 3. First-Year Modern Japanese
Foundation in grammar, reading, and composition. 150 Kanji characters introduced.
5 units, Spr (Busbin, K)

JAPANLNG 5. Intensive First-Year Japanese Language
Equivalent to 7B, 8B, and 9B combined. See http://www.stanford.edu/group/japanese/summer.
7-8 units, Sum (Yasumoto Magnani, E)

JAPANLNG 7A. First-Year Japanese Language, Culture, and Communication A, First Quarter
For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://www.stanford.edu/group/japanese/jlcca.htm.
3 units, Aut (Yasumoto Magnani, E)

JAPANLNG 7B. First-Year Japanese Language, Culture, and Communication B, First Quarter
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://www.stanford.edu/group/japanese/1stB.htm.
5 units, Aut (Lipton, H)

JAPANLNG 8A. First-Year Japanese Language, Culture, and Communication A, Second Quarter
For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://www.stanford.edu/group/japanese/jlcca.htm.
3 units, Win (Yasumoto Magnani, E)

JAPANLNG 8B. First-Year Japanese Language, Culture, and Communication B, Second Quarter
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://www.stanford.edu/group/japanese/1stB.htm.
5 units, Win (Lipton, H; Yasumoto Magnani, E)

JAPANLNG 9A. First-Year Japanese Language, Culture, and Communication A, Third Quarter
For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji tutorials. See http://www.stanford.edu/group/japanese/jlcca.htm.
3 units, Spr (Yasumoto Magnani, E)

JAPANLNG 9B. First-Year Japanese Language, Culture, and Communication B, Third Quarter
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://www.stanford.edu/group/japanese/1stB.htm.
5 units, Spr (Lipton, H; Yasumoto Magnani, E)

JAPANLNG 17A. Second-Year Japanese Language, Culture, and Communication A, First Quarter
Continuation of 9A. For students who want to build communication skills in limited time. Prerequisite: 9A or equivalent.
3 units, Aut (Nakamura, K)

JAPANLNG 17B. Second-Year Japanese Language, Culture, and Communication B, First Quarter
Goal is to express in spoken and written Japanese advanced concepts such as comparisons 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: 9B. See http://www.stanford.edu/group/japanese/2ndB2.htm.
5 units, Aut (Lowdermilk, M; Nakamura, K)

JAPANLNG 18A. Second-Year Japanese Language, Culture, and Communication A
Continuation of 9A. For students who want to build communication skills in limited time. See http://www.stanford.edu/group/ll/jlcc/2ndB2.htm. Prerequisite: 9A or equivalent.
3 units, Win (Arao, F)

JAPANLNG 18B. Second-Year Japanese Language, Culture, and Communication B, Second Quarter
Goal is spoken and written expression of advanced concepts such as comparisons 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: 9B. See http://www.stanford.edu/group/japanese/2ndB2.htm.
5 units, Win (Lowdermilk, M; Nakamura, K)

JAPANLNG 19A. Second-Year Japanese Language, Culture, and Communication A
Continuation of 18A. See http://www.stanford.edu/group/ll/jlcc/2ndB2.htm. Prerequisite: 9A or equivalent.
3 units, Spr (Arao, F)

JAPANLNG 19B. Second-Year Japanese Language, Culture, and Communication B, Third Quarter
Goal is to express in spoken and written Japanese advanced concepts such as comparisons 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: 19A. See http://www.stanford.edu/group/japanese/2ndB2.htm.
5 units, Spr (Lowdermilk, M; Nakamura, K)

JAPANLNG 20. Intensive Second-Year Japanese
(Same as JAPANLNG 20G.) Equivalent to 17B,18B,19B combined. Prerequisite 9B or equivalent. See http://www.stanford.edu/group/japanese/summer.
7-8 units, not given this year

JAPANLNG 21. Second-Year Modern Japanese, First Quarter
Continuation of 3. Expression of ideas, advanced grammatical patterns, 600 kanji characters, simple compositions, and enhanced understanding of Japanese culture. Goal is to read original source material. Prerequisite: 3 or equivalent.
5 units, Aut (Arao, F)

JAPANLNG 22. Second-Year Modern Japanese, Second Quarter
Continuation of 3. Expression of ideas, advanced grammatical patterns, 600 kanji characters, simple compositions, and enhanced understanding of Japanese culture. Goal is to read original source material. Prerequisite: 3 or equivalent
5 units, Win (Arao, F)

JAPANLNG 23. Second-Year Modern Japanese
Continuation of 3. Expression of ideas, advanced grammatical patterns, 600 kanji characters, simple compositions, and Japanese culture. Goal is to read original source material. Prerequisite: 3 or equivalent.
5 units, Spr (Arao, F)

JAPANLNG 27. Intermediate Japanese Conversation
Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite: 3, 9B, or consent of instructor.
2 units, Aut (Busbin, K)

JAPANLNG 28. Intermediate Japanese Conversation
Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite: 3, 9B, or consent of instructor.
2 units, Win (Busbin, K)

JAPANLNG 29. Intermediate Japanese Conversation
Develops oral proficiency through simple sentence patterns, audio tapes, and oral presentations. For the practical use of Japanese. Prerequisite: 3, 9B, or consent of instructor.
2 units, Spr (Busbin, K)

JAPANLNG 51. Intermediate to Advanced Japanese Conversation
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 17B, 18B, and 19B. Prerequisite: 9K, 19B, or consent of instructor.
2 units, Aut (Lowdermilk, M)

JAPANLNG 52. Intermediate to Advanced Japanese Conversation
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 17B, 18B, and 19B. Prerequisite: 9K, 19B, or consent of instructor.
2 units, Win (Lowdermilk, M)

JAPANLNG 53. Intermediate to Advanced Japanese Conversation
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 17B, 18B, and 19B. Prerequisite: 9K, 19B, or consent of instructor.
2 units, Spr (Lowdermilk, M)

JAPANLNG 99. Language Specials
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

JAPANLNG 121. Advanced Japanese Conversation, First Quarter
Focus is on improving speaking skills to narrate and describe things in detail. Audiovisual material and oral presentations. Prerequisite: 23, 29, 19B, or consent of instructor.
2 units, Aut (Lipton, H)

JAPANLNG 122. Advanced Japanese Conversation, Second Quarter
Focus is on improving speaking skills to narrate and describe things in detail. Audiovisual material and oral presentations. Prerequisite: 23, 29, 19B, or consent of instructor.
2 units, Win (Lipton, H)

JAPANLNG 123. Advanced Japanese Conversation, Third Quarter
Focus is on improving speaking skills to narrate and describe things in detail. Audiovisual material and oral presentations. Prerequisite: 23, 29, 19B, or consent of instructor
2 units, Spr (Lipton, H)

JAPANLNG 127B. Third-Year Japanese Language, Culture, and Communication B, First Quarter
Emphasis is on spontaneous conversations and expressing abstract thoughts. Materials include Japanese media, literature, and TV. Cultural and social topics related to Japan and its people. Prerequisite: 19B. See http://www.stanford.edu/group/japanese/3rdB.htm.
5 units, Aut (Tomiyama, Y; Lowdermilk, M)

JAPANLNG 128B. Third-Year Japanese Language, Culture, and Communication B, Second Quarter
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 http://www.stanford.edu/group/japanese/3rdB.htm. Prerequisite: 19B.
5 units, Win (Tomiyama, Y)

JAPANLNG 129B. Third-Year Japanese Language, Culture, and Communication B, Third Quarter
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 http://www.stanford.edu/group/japanese/3rdB.htm. Prerequisite: 19B.
5 units, Spr (Tomiyama, Y)

GRADUATE COURSES IN JAPANESE LANGUAGE

For graduate students only.

JAPANLNG 20G. Intensive Second-Year Japanese
(Same as JAPANLNG 20.) Equivalent to 17B,18B,19B combined. Prerequisite 9B or equivalent. See http://www.stanford.edu/group/japanese/summer.
7-8 units, not given this year

JAPANLNG 32G. Accelerated Beginning Business Japanese II
For GSB students only. Limited enrollment.
4 units, Spr (Staff)

JAPANLNG 33G. Accelerated Beginning Business Japanese III
For GSB students only. Limited enrollment.
4 units, Aut (Staff)

JAPANLNG 200. Directed Reading
Prerequisite: 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: 103, 129B, or equivalent.
3-5 units, Aut (Nakamura, K)

JAPANLNG 212. Advanced Japanese, Second 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: 103, 129B, or equivalent.
3-5 units, Win (Nakamura, K)

JAPANLNG 213. Advanced Japanese, Third 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: 103, 129B, or equivalent.
3-5 units, Spr (Nakamura, K)

JAPANLNG 394. Graduate Studies in Japanese Conversation
Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

JAPANLNG 395. Graduate Studies in Japanese
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES COURSES IN JAPANESE LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

KYOTO JAPANESE LANGUAGE COURSES

OSPKYOTO 9K. First-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff)

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)

OSPKYOTO 129K. Third-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff)

JAPANESE LITERATURE (JAPANLIT) COURSES

These courses typically require knowledge of Japanese. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For possible future offerings, see http://www.stanford.edu/dept/asianlang/courses/. For information on undergraduate and graduate programs in Japanese and other programs in the Department of Asian Languages, see the "Asian Languages" section of this bulletin. For courses in Japanese language instruction, see "Japanese Language Courses" section of this bulletin.

UNDERGRADUATE COURSES IN JAPANESE LITERATURE

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, Win (Carey, C)

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, Win (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
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)

JAPANLIT 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)

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 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.
5 units, Win (Kotas, F)

JAPANLIT 210. Orientalism, Occidentalism, Crossculturalism: Japan, China, and the West, Theory and Visual Culture
The relationship between China and Japan with reference to the hegemonic presence of the West. Texts that relate, re-read, negate, expand or diversify the concept of Orientalism. Readings include theoretical texts in postcolonial studies, gender issues, and visual culture. Sources include literature, film, and the arts.
4 units, Spr (Zohar, A)

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, Aut (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, Win (Carey, C)

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, Spr (Reichert, J)

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, Win (Matsumoto, Y)

JAPANLIT 267. Readings in Sino-Japanese
Readings in Sino-Japanese (kambun) texts of the Edo and Meiji periods, with focus on grammar and reading comprehension. Prerequisite: 264 or equivalent.
2-4 units, Aut (Reichert, J)

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 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
Works and topics vary each year. May be repeated for credit. Prerequisite: fourth-year Japanese or consent of instructor.
2-4 units, Win (Reichert, J)

JAPANLIT 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)

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, Aut (Matsumoto, Y)

JAPANLIT 395. Early Modern Japanese Literature
May be repeated for credit. Prerequisite: 247.
3-5 units, not given this year

JAPANLIT 396. Modern Japanese Literature
May be repeated for credit. Prerequisite: JAPANLNG 213.
3-5 units, not given this year

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 program description under the "Inter-University Center for Japanese Studies in Yokohama" section in the Stanford Bulletin.
1-15 units, Aut (Staff), Win (Staff), Spr (Staff)

JEWISH STUDIES (JEWISHST) COURSES

For information on undergraduate programs in Jewish Studies, including a list of cognate courses applicable to an Individually Designed Major in Jewish Studies, see the "Jewish Studies" section of this bulletin.

GRADUATE COURSES IN JEWISH STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

JEWISHST 299A. Directed Reading in Yiddish, First Quarter
1-5 units, Aut (Staff)

KOREAN LANGUAGE (KORLANG) COURSES

Students registering for the first time in a first- or second-year course must take a placement test if they had any training in Korean before entering Stanford. All entering students must take Part I (written) of the placement test online during the summer, followed by Part II (oral and written), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN KOREAN LANGUAGE

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.
5 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.
5 units, Win (Kim, H)

KORLANG 3. First-Year Korean, Third Quarter
Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language.
5 units, Spr (Kim, H)

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 (Kim, H)

KORLANG 22. Second-Year Korean, Second 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, Win (Kim, H)

KORLANG 23. Second-Year Korean, Third 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, Spr (Kim, H)

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.
2-3 units, Aut (Staff)

KORLANG 102. Third-Year Korean, Second 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.
2-3 units, Win (Staff)

KORLANG 103. Third-Year Korean, Third 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.
2-3 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, Win (Kim, H)

KORLANG 130. Reading Korean
Contemporary literature and academic texts. Prerequisite: 103 or consent of instructor.
1-3 units, Aut (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

For graduate students only.

KORLANG 200. Directed Reading in Korean
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), 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

For information on graduate programs in Latin American Studies, including a list of applicable cognate courses, see the "Latin American Studies" section of this bulletin.

UNDERGRADUATE COURSES IN LATIN AMERICAN STUDIES

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
Required of Latin American Studies master's students each quarter. Guest scholars present analyses of major Latin American themes and topics. May be repeated for credit.
1 unit, Aut (Klein, H), Win (Klein, H), Spr (Klein, H)

LATINAM 201. Social Change in Latin America Since 1900
(Same as HISTORY 275F, HISTORY 375F, LATINAM 301.) Changes in the social and demographic characteristics of Latin American populations since 1900 and the response of national governments in terms of the evolution of social welfare, health, and educational systems. Fulfills requirement for Latin American Studies honors seminar. Required core course for Latin American Studies master's students. GER:DB-SocSci
4-5 units, Aut (Klein, H)

GRADUATE COURSES IN LATIN AMERICAN STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

LATINAM 301. Social Change in Latin America Since 1900
(Same as HISTORY 275F, HISTORY 375F, LATINAM 201.) Changes in the social and demographic characteristics of Latin American populations since 1900 and the response of national governments in terms of the evolution of social welfare, health, and educational systems. Fulfills requirement for Latin American Studies honors seminar. Required core course for Latin American Studies master's students.
4-5 units, Aut (Klein, H)

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)

OVERSEAS STUDIES COURSES IN LATIN AMERICAN STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

MADRID LATIN AMERICAN STUDIES COURSES

OSPMADRD 22. Spain on Stage: Theater and Performance in 2009
5 units, Spr (Surwillo, L)

OSPMADRD 24. Spain and Africa through the Ages
3 units, Spr (Surwillo, L)

OSPMADRD 25. European Legal History
5 units, Aut (Herzog, T)

OSPMADRD 26. Issues in European Law
4 units, Aut (Herzog, T)

OSPMADRD 34. Modern Spain
5 units, Win (Herzog, T)

OSPMADRD 35. Issues in Spanish History
4 units, Win (Herzog, T)

OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World
4 units, Aut (Tejerina-Canal, S)

OSPMADRD 41. Dissidence and Continuity: Spanish Theater, 1907 to the Present
4 units, Win (Tejerina-Canal, S)

OSPMADRD 42. A European Model of Democracy: The Case of Spain
5 units, Win (Bobillo de la Peña, F)

OSPMADRD 43. The Jacobean Star Way and Europe: Society, Politics and Culture
5 units, Spr (Larrañaga Zulueta, M)

OSPMADRD 45. Women in Art: Case Study in the Madrid Museums
4 units, Win (Doménech López, J)

OSPMADRD 67. Women in Spain: From Tradition to Postmodernity
5 units, Spr (Botella Ordinas, E)

OSPMADRD 72. Issues in Bioethics Across Cultures
5 units, Win (de Lora del Toro, P)

SANTIAGO LATIN AMERICAN STUDIES COURSES

OSPSANTG 10. Borges and Argentina
4-5 units, Win (Missana, S)

OSPSANTG 14. Women Writers of Latin America in the 20th Century
4-5 units, Aut (Missana, S)

OSPSANTG 17. Chilean Fiction of the 20th Century
4-5 units, Spr (Missana, S)

OSPSANTG 17. Chilean Fiction of the 20th Century
4-5 units, Spr (Missana, S)

OSPSANTG 45. The Cinema of the Chilean Transition (1990-2007)
3-5 units, Aut (Ruffinelli, J)

OSPSANTG 46. Topics in Chilean Cultural Expressions
3-5 units, Aut (Ruffinelli, J)

OSPSANTG 58. Living Chile: A Land of Extremes
5 units, Aut (Reid, S), Win (Reid, S)

OSPSANTG 62. Topics in Chilean History
4-5 units, Win (Jaksic, I)

OSPSANTG 68. The Emergence of Nations in Latin America
4-5 units, Aut (Jaksic, I), Spr (Jaksic, I)

OSPSANTG 85. Marine Ecology of Chile and the South Pacific
5 units, Spr (Palma, A)

OSPSANTG 104X. Modernization and Culture in Latin America
5 units, Aut (Subercaseaux, B)

OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century
5 units, Spr (Correa, G)

OSPSANTG 118X. Artistic Expression in Latin America
5 units, Win (Albornoz, C)

OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies
5 units, Spr (Munoz, O)

OSPSANTG 129X. Latin America in the International System
4-5 units, Win (Fuentes, C)

OSPSANTG 141X. Politics and Culture in Chile
5 units, Spr (Subercaseaux, B)

OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective
5 units, Aut (Micco, S)

LAW (LAW) COURSES

Courses listed in the courses section under the LAW subject code are open to Stanford non-Law students with consent of instructor.

Each course indicates whether it is on the quarter or semester schedule. Non-Law students who register for courses with a LAW subject code are awarded quarter units upon completion of the course; semester unit values are converted into quarter unit values for non-Law students at the time of enrollment. Courses with non-LAW subject codes that are crosslisted with LAW courses have quarter-based units, and no conversion is performed for undergraduates or graduate students. See the respective department's section of this bulletin for such unit values.

Students intending to enroll in any course with a LAW subject code must consult the School of Law Registrar's Office in the Stanford Law School Administration Building, room 100, or see http://www.law.stanford.edu/school/offices/registrar. For additional detailed course information, see the Office of the Law School web site at http://www.law.stanford.edu/program/courses. For information on the School of Law, see the "Law" section of this bulletin.

GRADUATE COURSES IN LAW

The following School of Law courses are open to qualified graduate students in other departments of the University with consent of instructor.

LAW 222. Legal Research: Advanced
Open to Law and Stanford graduate students. Preparation for research in practice and clerkships. Emphasis is on cost-effective research, legislative analysis, administrative law research, and open-access resources. How to evaluate sources and use them effectively, expand skills in primary and secondary U.S. legal sources, develop skills for effective online research, and use non-legal information resources. Final project.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Wayne, E; Lomio, J; Wilko, K; Wilson, G), Win quarter schedule (Lomio, J; Wilko, K; Wayne, E; Wilson, G)

LAW 227. The Political Economy of Energy Policy
Theories of political economy that explain policy choices and behavior in energy markets in the U.S. and overseas. Topics include: collective action and public choice; state behavior and sovereignty; international political economy; behavior of complex organizations; monopoly and regulation.Case study applications, such as U.S. policy on ethanol, safety regulation at nuclear power plants, and international collective efforts to manage global warming. Prerequisite: familiarity with energy systems and policies.

2.5 semester units (3.75 quarter units), Win quarter schedule (Victor, D)

LAW 233. Antitrust
Legal and economic concepts of competition and monopoly; policy and judicial interpretations of the Sherman and Clayton acts and their applications to business practices and industrial structure. Ethical considerations.

3.4 semester units (5.1 quarter units), Aut quarter schedule (Koob, C)

LAW 236. Art and the Law
International law and the fate of works of art in wartime. International trade in stolen and illegally exported art and antiquities. Artist rights such as moral right, copyright, and resale right. Artistic freedom and its limits. Artist relationships with dealers, commissions, live-work space, toxic hazards, taxes, estate planning, and legal services . The collector. Counterfeit art. The legal character and obligations of museums, and their trustees, directors, and staff. The National Endowment for the Arts and Humanities.

2.5 semester units (3.75 quarter units), Win quarter schedule (Merryman, J)

LAW 238. Administrative Law
Administrative agencies interpret statutes, promulgate regulations, and adjudicate disputes, thereby affecting employment, food and drug safety, the environment, energy markets, telecommunications, and immigration. Surveys the law of the administrative state, considering rationales for delegation to administrative agencies, procedural and substantive constraints of agency decision-making, and the judicial review of agency actions.

3.4 semester units (5.1 quarter units), Aut quarter schedule (Ho, D)

LAW 243. Bayesian Statistics and Econometrics
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.

2-6 semester units (3-9 quarter units), Aut quarter schedule (Strnad, J)

LAW 248. Corporate Reorganization
Reorganization of a fictitious, financially distressed company under chapter 11 of the Bankruptcy Code, including: out-of-court workout; chapter 11 filing; chapter 11 operating issues; and the negotiation, formulation, and confirmation of a plan of reorganization. Developments in actual pending chapter 11 cases, through media reports.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Ray, S)

LAW 262. Corporate Finance I
For those with little background in finance; not open to J.D. or M.B.A. students. Financial concepts and analytical tools needed to make financial decisions and value securities. Capital structures, the design of corporate securities, corporate transactions, executive compensation, and bankruptcy proceedings. Focus is on problem solving.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Ishii, J)

LAW 269. Foreign Affairs and the Constitution
Focus is on issues of separation of powers and federalism. Topics such as the treaty power, war powers, and customary international law. Current controversies, including those arising from the war on terrorism, Supreme Court cases related to the death penalty and the Vienna Convention on Consular Relations, the Alien Tort Claims Act, and international trade agreements such as the WTO and NAFTA. Recommended: LAW 283.

2.5 semester units (3.75 quarter units), Win quarter schedule (Martinez, J)

LAW 277. Economic Analysis of Law
(Same as PUBLPOL 202B.) Core course for Public Policy master's students. How legal rules and institutions can correct market failures.The economic function of contracts; role of legal remedies to resolve disputes when contracts fail. The choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors such as regulatory authorities. Economics of litigation; how private incentives to bring lawsuits differ from the social value of litigation. Economic motives to commit crimes; optimal governmental response to crime. Prerequisites: intermediate-level microeconomics; some calculus.

3.4 semester units (5.1 quarter units), Win quarter schedule (Polinsky, M)

LAW 283. Federal Courts
The role of the federal courts in the American system of federalism and separation of powers, and their role in the development of substantive federal law and constitutional rights. Historical context, especially the social, political, and legal movements, in response to which the federal courts have developed. Traditional aspects of federal court jurisprudence. Interdisciplinary readings.

3.4 semester units (5.1 quarter units), Win quarter schedule (Spaulding, N)

LAW 285. International Trade Regulation
Law and policy of the WTO system and related national laws. Topics include the relationship between international and domestic law, the international dispute resolution system, legal restrictions on traditional barriers to trade, nondiscrimination obligations in international trade, trade and the environment, technical barriers to trade, safeguards and adjustment mechanisms, antidumping and countervailing duty law, and trade services.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Sykes, A)

LAW 288. Governance and Ethics: Anti-Corruption Law, Compliance and Enforcement
Laws and regulations in the U.S. governing ethical conduct of public and industry officials and the extent to which they reflect the moral values of the community and the principles central to a democratic government. Alternative approaches to ethical conduct based on principles and values rather than compliance. Emerging global ethical and governance standards, reporting principles, and their application to emerging markets. How cultural, religious, and moral differences might impact the effectiveness of these standards.

2.5 semester units (3.75 quarter units), Win quarter schedule (Abramov, I)

LAW 291. Evidence, Advanced
Goal is to develop witness interrogation skills. Direct and cross examination of lay and expert witnesses, introduction of documentary evidence, and use of illustrative evidence in California and federal courts. The art of examining friendly and hostile witnesses. Enrollment limited to six. Prerequisite: 290, application

2.5 semester units (3.75 quarter units), Win quarter schedule (Mendez, M)

LAW 293. Family Law
Rules regarding the making and breaking of legally recognized relationships, especially those between marital partners and parents and children. Focus is on the institution of marriage.

3.4 semester units (5.1 quarter units), Win quarter schedule (Banks, R)

LAW 304. Law and the Rhetorical Tradition
(Same as PWR 194.) The rhetorical underpinnings of legal argument. Elements of the rhetorical tradition; how to analyze written and oral legal and non-legal texts with an eye to the use and function of rhetorical principles. How form and content are mutually constitutive. Understanding of rhetoric as readers and interpreters of legal texts and development of skills as writers and speakers.

2.5 semester units (3.75 quarter units), Win quarter schedule (Sassoubre, T)

LAW 307. Gender, Law, and Public Policy
Open to non-Law students with consent of instructor. Topics include equal protection standards, employment, reproductive rights, sexual harassment, rape, domestic violence, pornography, sexual orientation, feminist legal theory, and the family. (Semester schedule.)

3 semester units (4.5 quarter units), Win semester schedule (Rhode, D)

LAW 308. Cultural Heritage Law and Policy
Preference to students who have taken LAW 236 or comparable preparation. Seminar. Focus is on national and international attention to law and policy concerning works of art, antiques, architectural monuments, archives, and intangible cultural heritage. Research paper.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Merryman, J)

LAW 311. Comparative Law
Issues of convergence of national legal systems, and American exceptionalism. Sources include contemporary Western European legal systems. Legal education, the role of judges and judging, the function and meaning of codes versus precedent, private law/public law distinction, constitutional courts, judicial review, and approaches to contract. Public law questions on racial equality and affirmative action, gender equality and sexual harassment, citizenship, and church and state.

1.7 semester units (2.55 quarter units), Win quarter schedule (Kessler, A)

LAW 318. History of American Law
(Same as HISTORY 352B). 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.

2.5 semester units (3.75 quarter units), Win semester schedule (Gordon, R)

LAW 321. Patent Prosecution
(Same as ME 238.) 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 a patent application advances the patent portfolio; and in what countries a patent application should be filed.

1.33 semester units (2 quarter units), Win quarter schedule (Schox, J)

LAW 322. Patent Litigation Workshop
Simulations of the strategy and pretrial preparation of a patent lawsuit. Materials include information typical to a patent lawsuit: a patent, file history, prior art, and information regarding the accused product. Students represent either the patentee or the accused infringer. Students plan litigation strategy, meet with and advise a client, conduct written discovery, take and defend depositions, and brief and argue claim construction and motions for summary judgment. Some knowledge of patent law is presumed. Pre- or corequisite: LAW 326.

2.5 semester units (3.75 quarter units), Win quarter schedule (Galloway, M)

LAW 325. Comparative and International Employment Discrimination
Comparison of laws prohibiting employment discrimination in the U.S. with those of other countries. Differences between regimes in social context; how differing histories, demographics, economic institutions, and political commitments have produced various approaches to employment discrimination. How and why laws prohibiting discrimination have become widespread, looking to international and local influences. Prerequisite: LAW 349 or consent of instructor.

2.5 semester units (3.75 quarter units), Not given this year (Ford, R)

LAW 326. Intellectual Property: Patents
Major aspects of patent law, primarily as applied in the US; patentability, including novelty, nonobviousness, enablement, infringement, and remedies. Focus is on essential legal principles and a policy analysis of the patent system. Goal is to provide background for non-patent specialists and those planning a career in the field.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Lemley, M)

LAW 330. International Human Rights
Contemporary system of international human rights, including civil, political, social, and economic rights. Women's and children's rights, indigenous rights, rights to democratic governance, and rights to cultural practices that differ from Western notions of human rights. Structure and role of international, regional and domestic bodies that report and adjudicate human rights claims. Normative justifications for human rights, and the challenges to these justifications posed by arguments for cultural relativism, and the forces of globalization. Recommended: international public law or equivalent.

2.5 semester units (3.75 quarter units), Win quarter schedule (Stacy, H)

LAW 332. International Development
Current research. How political institutions determine economic policy choices, and economic structures affect political processes. Bridges theory and practice to investigate micro- and macro-level political and economic processes shaping the prospects for development. Case studies on market function, why seemingly inefficient institutions survive, and why governments adopt policies detrimental to development. Topics include: the political economy of corruption, the role of foreign aid, the efficacy of governance reforms, and the relationship between democracy and development.

2.5 semester units (3.75 quarter units), Win quarter schedule (Singh, S)

LAW 333. Judgment and Decision Making
(Same as PUBLPOL 205A, IPS 207A.) Theories and research on heuristics and biases in human inference, judgement, and decision making. Experimental and theoretical work in prospect theory emphasizing loss and risk aversion. Support theory. 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. Prerequisites.

3.0 semester units (4.5 quarter units), Win quarter schedule (Brest, P)

LAW 343. Scientific Evidence and Expert Testimony: Patent Litigation
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 oral arguments.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Morris, R)

LAW 344. Law and Economics Seminar I
.Current research by lawyers and economists on topics in law and economics. Guest speakers. Topics may include contribution among antitrust defendants, the philosophical foundations of the economic analysis of law, compensation for government regulations and takings, liability rules for controlling accidents, and the corporate tax treatment of nonprofit institutions. Prerequisite: LAW 275 or introductory microeconomics course.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Polinsky, M)

LAW 344. Law and Economics Seminar II
Current research by lawyers and economists on topics in law and economics. Guest speakers from other universities present current research. Topics include contribution among antitrust defendants, the philosophical foundations of the economic analysis of law, compensation for government regulations and takings, liability rules for controlling accidents, and the corporate tax treatment of nonprofit institutions.

1.7 semester units (2.55 quarter units), Win quarter schedule (Polinsky, M)

LAW 345. Law and Culture in American Fiction
How literary texts register changes in property law, the law of contracts, intellectual property and legal constructions of race, gender, and privacy, as they relate to the maintenance of personal identity, community stability, and linguistic meaning. A novel or story is paired with relevant legal and historical readings, considering the points of contact between literary narrative and narrative in law. Authors include James Fenimore Cooper, Herman Melville, Henry James, Theodore Dreiser, Nella Larsen, William Faulkner, and Sherman Alexie.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Sassoubre, T)

LAW 347. Law and Culture in American Film
Representations of law in 20th-century American film, particularly Westerns, gangster films, and courtroom dramas. Themes include the asymmetry of law and justice, the relationship between law and social change, the public and private identities of lawyers, anxiety that the rule of law fails individuals and minorities, and the disciplinary modes of law and culture. Convergence of narrative, visual, aural, and dramatic practices in legal proceedings and cinematic productions.

2.5 semester units (3.75 quarter units), Win quarter schedule (Sassoubre, T)

LAW 356. Dispute Resolution in International Economic Law
(Same as POLISCI 404.) 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.

1 semester unit (1.5 quarter units), Aut quarter schedule (Goldstein, J; Sykes, A), Win quarter schedule (Goldstein, J; Sykes, A)

LAW 359. Tax Policy
Issues in tax policy, progressivity, income versus consumption tax, property tax and school finance, tax simplification, tax compliance and tax shelters. Possible tax initiatives of the new administration in Washington.

2.5 semester units (3.75 quarter units), Win quarter schedule (Bankman, J)

LAW 361. Economic and Social Organization of the Legal Profession
(Same as SOC 133/333.) 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. Student groups collect and analyze data about the profession and its markets. Multimedia tools for analysis and for producing workplace reforms.

2.5 semester units (3.75 quarter units), Win quarter schedule (Dauber, M)

LAW 362. Foundations of Statistical Inference
(Same as IPS 205C, PUBLPOL 203C.) Statistical background and introduction to regression. Topics include hypothesis testing, linear regression, nearest-neighbors regression, and other statistical concepts. Hands-on empirical analysis via computer exercises using statistical packages; how to analyze empirical studies, conduct empirical research, and cross-examine or work with statistical experts.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Strnad, J)

LAW 366. Principles of Research Design and Analysis: Tools
(Same as PUBLPOL 203B, IPS 205B.) Review of statistical background material. Statistical research for public policy analysis, including multiple regression analysis, multilevel modeling, and Bayesian analysis. Policy analysis in government, research institutes, and academia, complex empirical issues in litigation, investment banking, consulting and finance. Topics include hypothesis testing, regression specification, logistic regression, probit, serial correlation, errors in variables, instrumental variables, simultaneous equations, generalized linear models, simulation, causal inference, and missing data imputation. Empirical analysis via computer exercises using popular statistical packages. Prerequisite: basic statistics .

3 semester units (4.5 quarter units), Win quarter schedule (Strnad, J)

LAW 367. Principles of Research Design and Analysis: Advanced Mathematical & Computational Methods
Adjunct to 366 for students who wish to work at a deeper mathematical level. Corequisite: 366.

1 semester unit (1.5 quarter units), Win quarter schedule (Strnad, J)

LAW 368. Law and the Biosciences: Neuroscience
(Same as HRP 211.) 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. (Semester schedule.)

2 semester units (3 quarter units), Win Semester schedule (Greely, H)

LAW 372. Legal History Workshop
(Same as HISTORY 307A.) 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.

2.5 semester units (3.75 quarter units), Win quarter schedule (Kessler, A)

LAW 383. Research Design for Public Policy Analysis
(Same as IPS 205A, PUBLPOL 203A.) Translate the questions of policy controversies to questions that are susceptible to empirical research. How to select the most appropriate research strategy for different types of questions. Requirements for designing sample surveys, case studies, and experiments, and methods for conducting

interviews with individuals and groups, observational studies and textual analysis. Final paper is a research design for investigating a policy question of the student's choice.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Hensler, D)

LAW 407. International Deal Making: Legal and Business Aspects

The application of legal and business knowledge to real world international transactions. Topics include deal structuring, identifying and resolving legal and business concerns, negotiations, documentation, deal closing, legal issues in cross-border transactions, importance of legal documents in business transactions, and the role of the legal advisor. Case studies. Students strategize, structure, and negotiate real world, substantive, international business deals.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Franklin, L)

LAW 409. Introduction to Intellectual Property

Patents, copyrights, trademarks, and trade secrets. Commonalities and differences among systems of intellectual property protection.

3.4 semester units (5.1 quarter units), Win quarter schedule (Lemley, M)

LAW 440. Biotechnology Law and Policy

Legal and policy issues raised by the biotechnology industry. Issues include patenting, corporate organization and financing, conflicts of interest, regulatory approvals, health care financing issues, and tort liability. Prospects for and implications of the biotechnology revolution. Organized around hypothetical problems. Undergraduates require consent of instructor.

1.7 semester units (2.55 quarter units), Win quarter schedule (Greely, H)

LAW 447. Communications Law

Comprehensive overview of current communications law as it has emerged over the past 100 years, in the form of industry-specific laws and through related areas of law such as antitrust and first amendment law. Existing pressures on the system, available solutions, and the broader economic and political implications of the legal and technical choices that communications law is facing today. Focus is on the U.S.; attention to developments elsewhere.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Van Schewick, B)

LAW 458. FDA's Regulation of Health Care

(Same as HRP 209.) Open to law or medical students; graduate students by consent of instructor. Focus on the FDA's regulation of drugs, biologics, medical devices, nutritional supplements, and its jurisdiction over food, legal, social, and eithical issues arising from advances in the biosciences.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Greely, H)

LAW 467. Quantitative Methods: Finance

The time value of money. Present and future value analysis; discounting; net present value; IRR; bond valuations; and a critique of other project valuation methods. Diversification, the risk-return trade-off, portfolio performance measurement, and market efficiency. Arbitrage and tax considerations. Emphasis is on applications in legal settings.

1.7 semester units (2.55 quarter units), Win quarter schedule (Siciliano, F)

LAW 468. Statistical Inference in Law

Tools, concepts, and framework to become consumers of quantitative evidence and social science. Case law as a springboard for considering quantitative evidence.

2.5 semester units (3.75 quarter units), Win quarter schedule (Ho, D)

LAW 470. Originalism's Alternatives

Competing methods for interpreting constitutional text. Alternatives within originalist methodology and alternatives to originalism, such as common-law reasoning, moral readings, democratic themes, foreign sources, and judicial minimalism. Focus on judicial decision making. Justifications for treating ancient constitutional text as law, the formal amendment process, defenses of judicial review, and influences on judicial behavior aside from interpretive method.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Samaha, A)

LAW 471. Constitutional Law II: Free Speech

Speech, press, and associational rights under the First Amendment. Focus is on case law; attention to normative theory, emerging controversies, and empirical questions. Topics include sedition and suspected sleeper cells, government secrets and journalist privileges, personal privacy and reputational injury, communications network access and FCC indecency regulation, racist and sexist speech and associations, commercial advertising and trade secret protection, campaign financing, and Internet regulation.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Samaha, A)

LAW 483. Deal Litigation Seminar

Practical and doctrinal perspective on mergers and acquisitions litigation. Case studies from practice in the Delaware courts where much contemporary deal litigation occurs; students apply cases and legal principles in practical situations that may arise in a transactional litigation practice. The litigator's role in the transactional setting. Prerequisite: familiarity with basic corporate law principles.

1.7 semester units (2.55 quarter units), Win quarter schedule (Silverberg, R)

LAW 513. California Climate Change Law and Policy

The California Global Warming Solutions Act of 2006, the clean cars and trucks bill, and the greenhouse gas emissions performance standard. Complementary and subsidiary regulations such as the renewable portfolio standard, the low Carbon fuel standard, land use law, and energy efficiency and decoupling. Focus is on the draft scoping plan to outline California's policies for economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. History, details, and current status of California's efforts.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Grenfell, K)

LAW 514. The California Coast: Science, Policy, and Law

(Same as EARTHSYS 175, EARTHSYS 275, CEE 175A, CEE 275A.) 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.

3.4 semester units (5.1 quarter units), Win quarter schedule (Boehm, A; Sivas, D; Caldwell, M)

LAW 539. Law and Policy of the European Union

(Same as IPS 232.) European legal and institutional integration, the nature and sources of EU law, the evolution of the single market, and the building of a supranational judicial system. General principles of EU law, the scope of Community powers and their application in the national legal systems of the member states, EU legislation and adjudication, the four freedoms of the single market, corporate and competition policy, and human rights law. U.S.-EU trade and anti-trust issues, cooperation in defense, development assistance, promotion of democracy, and relations in the context of the new challenges to global governance.

2.5 semester units (3.75 quarter units), Win quarter schedule (Morningstar, R; Magen, A)

LAW 549. Chinese Legal System: Introduction to the

Legal institutions, major areas of substantive and procedural law, and the gap between law on the books and in action. Topics include the World Trade Organization, the Communist Party's recognition of private property, and reforms of financial system and human rights protection mechanisms.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Gechlik, M)

LAW 550. Uses of Policy Analysis in the Law

Uses of policy analysis in substantive and procedural law reform and the practical and political constraints that limit its usefulness. Case study approach, including examples of policy analyses that played a role in recent policy debates, in the legislative arena, and in key court decisions. Previous topics include capital punishment, school vouchers, class actions, racial profiling, three-strikes laws, gun control, and gays in the military. Final paper. Prerequisite: LAW 383.

1.7 semester units (2.55 quarter units), Win quarter schedule (Hensler, D)

LAW 565. Immigration Law: Current Constitutional and Civil Rights Issues
Issues related to the constitutional and civil rights of immigrants. Focus is on the statutory framework regulating the admission of non-citizens and the constitutional principles that govern immigration law and policy. Issues may include restrictions on federal court jurisdiction over immigration matters, detention of non-citizens, public and private discrimination on the basis of alienage, labor and workplace rights of immigrant workers, refugee and asylum law, post 9/11 issues, local and state laws targeting immigrants, and matters pending in the Supreme Court. Guest lecturers.

1.7 semester units (2.55 quarter units), Aut quarter schedule (Guttentag, L)

LAW 569. Religion and the Constitution
(Same as POLISCI 336T.) Issues of religious toleration in political theory and in American constitutional law. Topics include: whether religion merits the special constitutional solicitude provided by the First Amendment's religion clauses; religion as distinct from culture, morality, and philosophy as understood for constitutional purposes; the tensions between ensuring free exercise and avoiding religious establishment; cases for and against free exercise exemptions; and whether the religion clauses can be understood as serving a single fundamental value such as liberty, equality, or neutrality. Readings from political and constitutional theory including Bodin, Locke, Madison, Jefferson, Rawls, Nussbaum, McConnell, Okin, Choper, Hamburger, and constitutional cases.

2.5 semester units (3.75 quarter units), Win quarter schedule (Cohen, J; Sullivan, K)

LAW 576. Sexual Orientation and The Law
How the law addresses contested contemporary issues concerning sexual orientation. Constitutional, criminal, family, and anti-discrimination law. Regulation of sexual conduct, discrimination in the military and Boy Scouts, the law concerning sexual minorities as parents, conflicts between sexual and religious freedom, and the role of direct democracy in shaping sexual orientation law. Debate over same-sex marriage. Emerging sexual identities such as transsexuality and intersexuality. Interdisciplinary focus on how social, cultural and political forces shape, and are shaped by, legal doctrine. How gender structures sexual orientation debates.

1.7 semester units (2.55 quarter units), Win quarter schedule (Schacter, J)

LAW 581. Workshop in Sociology of Law
(Same as SOC 338.) 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.

1-3 semester units (1.5-4.5 quarter units), Win quarter schedule (Dauber, M; Sandefur, R)

LAW 585. Introduction to Transnational Law
International aspects of modern legal practice. Public and private international law, and comparative law. Case studies focus on human rights, environment, trade, and commercial law. National sovereignty in the era of globalization, the democratic deficit of international institutions, theories about why nations obey or disobey international law, how nations internalize or reject international norms, how international institutions interact with national legal systems, and the role of non-state actors in the international system.

2.5 semester units (3.75 quarter units), Win quarter schedule (Martinez, J)

LAW 599. Climate Change Workshop
Students prepare papers to be used as technical support for problems that arise in the negotiations for the new global climate change agreement. Examples of paper subjects include analyzing the performance of proposed financial mechanisms in support of climate favoring technologies, the roles of intellectual property in facilitating or impeding technology diffusion, and the effectiveness of existing or past efforts to influence technology innovation at national or international levels. Focus is on output to those questions framed by the negotiation issues where bottlenecks may be avoided through improved technical support. (Semester schedule)

3 semester units (4.5 quarter units), Aut semester schedule (Heller, T), Win semester schedule (Heller, T)

LAW 603. Environmental Law and Policy
Federal environmental laws, regulatory structures. and environmental policies. The property law roots of environmental law and current primary analytical frameworks of use in understanding environmental law and policy. Federal statutes including the Clean Air Act, the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act, Superfund (CERCLA), and the Resource Recovery and Conservation Act. Case studies from environmental cases and controversies.

2.5 semester units (3.75 quarter units), Win quarter schedule (Wara, M)

LAW 604. Environmental Law Workshop: Clean Technology
Current research and work in environmental and natural resources field focused on clean technologies. Academics, policy makers, and business leaders from various disciplines present current research or work. May be repeated for credit.

2.5 semester units (3.75 quarter units), Win quarter schedule (Caldwell, M; Thompson, B)

LAW 608. Environmental Science for Managers and Policy Makers
(Same as IPER 335, OIT 338.) Core course for joint J.D. or M.B.A. and M.S. in Environment and Resources. How to apply scientific understanding to business operations, strategy, and the design of market-based environmental policy. Fundamentals of earth systems and environmental science. Spreadsheet modeling, optimization, and Monte Carlo simulation.

2.66 semester units (3.99 quarter units), Win quarter schedule (Plambeck, E; Daily, G; Masters, G; Palumbi, S)

LAW 611. International Conflict Resolution Colloquium
(Same as PSYCH 283, POLISCI 403.) 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 semester unit (1.5 quarter units), Win quarter schedule (Weiner, A; Holloway, D; Ross, L)

LAW 615. Negotiation
Tools and concepts for analyzing and preparing for negotiations. Role play. Issues of representation, ethics, and the place of negotiation in the legal system. Autumn section 615-04; Winter section 615-01. (Semester schedule.)

4 semester units (6 quarter units), Aut semester schedule (Netsch, L), Win semester schedule (Avila, S)

LAW 643. Medical-Legal Issues in Children's Health
(Same as PEDS 211.) Collaboration of medical and legal fields, such as between future physicians and attorneys, to improve health outcomes for low-income children. Focus is on the effects of poverty on children's health. Topics such as asthma, immigration, and health insurance. Service learning including intake interviews with patient families and analysis of their medical-legal issues. Group project on local or state medical-legal policy issue. Final paper.

4 semester units (6 quarter units), Win quarter schedule (Rodgers, M; Weintraub, D)

LAW 656. International Conflict: Management and Resolution
(Same as IPS 250, POLISCI 210R/310R.) 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).

2 semester units (3 quarter units), Win quarter schedule (Weiner, A; Holloway, D)

LAW 671. Critical Theory
Developments in critical theory as it relates to law and jurisprudence. The critical tradition in Western philosophy including thinkers such as Friedrich Nietzsche, Karl Marx, Max Weber, Jean Paul Sartre, and Michel Foucault. Influence of this critical tradition in American legal theory, tracing the critical turn through the Americal legal realists, critical legal studies, and the emergence of identity-based critical movements such as critical race theory, critical feminist theory, and critical approaches to sexual orientation.

2.5 semester units (3.75 quarter units), Aut quarter schedule (Ford, R)

LAW, NONPROFESSIONAL (LAWGEN) COURSES

The following courses, offered by the School of Law, may not be counted toward professional degrees in Law. Unit values listed in LAWGEN courses are quarter-based.

UNDERGRADUATE COURSES IN LAW, NONPROFESSIONAL

Primarily for graduate students; undergraduates may enroll with consent of instructor.

LAWGEN 106. Introduction to American Law
(Same as AMSTUD 179, 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 quarter units, Aut quarter schedule (Friedman, L)

LAWGEN 110Q. Criminal Justice and the Criminal Courts
Focus is on the structures and theories at play in the criminal court system, emphasizing court procedures, structures, constitutional guarantees, and the trial process. The roles of individual agents, including the police, prosecutors, defense attorneys, judges, probation officers, and corrections officials.

3 quarter units, Spr quarter schedule (Dansky, K)

GRADUATE COURSES IN LAW, NONPROFESSIONAL

LAWGEN 206. Thinking Like a Lawyer
(Same as GSBGEN 382.) Open to all graduate students. An analytical framework for understanding the core concepts of the law; how lawyers analyze and structure their work. Foundational principles of law. Topics such as contracts, litigation, intellectual property, securities, and employment law.

3-4 quarter units, Win quarter schedule (Kelman, M; Kramer, L)

LAWGEN 209. Stanford Community Police Academy
Open to all students. Practical experience. The duties, responsibilities, decisions, and constraints that face law enforcement officers. Prerequisites: miminum 18 years of age; valid driver's license; background check.

1 quarter unit, Win quarter schedule (Dubois, M; Wilson, L)

LINGUISTICS (LINGUIST) COURSES

For information on undergraduate and graduate programs in the Department of Linguistics, see the "Linguistics" section of this bulletin.

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

UNDERGRADUATE COURSES IN LINGUISTICS

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.

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 (Eckert, P; Sag, I), 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, Aut (Sumner, M)

LINGUIST 62N. The Language of Food
Stanford Introductory Seminar. Preference to freshmen. The relationship between food and language around the globe. The vocabulary of food and prepared dishes, and crosslinguistic similarities and differences, historical origins, forms and meanings, and relationship to cultural and social variables. The structure of cuisines viewed as meta-languages with their own vocabularies and grammatical structure. The language of menus; their historical development and crosslinguistic differences.

3 units, Aut (Jurafsky, D)

LINGUIST 63N. Translation
Stanford Introductory Seminar. Preference to freshmen. 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 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. GER:DB-SocSci, EC-AmerCul

3-5 units, Spr (Rickford, J)

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 (Streichler, S)

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, 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 (Wasow, T)

LINGUIST 124A. Introduction to Formal Universal Grammar
(Same as LINGUIST 224A.) A formal model of universal grammar designed to explain crosslinguistic variation in syntactic structure: nonconfigurationality in Australian aboriginal languages, incorporation in native American languages and the Bantu languages of Africa, scrambling and head movement in European languages. Issues such as universal grammar design, and analytic problems from a variety of natural languages. Prerequisites: introduction to syntax and familiarity with logic or other symbolic systems, or consent of instructor. GER:DB-SocSci

4 units, not given this year

LINGUIST 130A. Introduction to Linguistic Meaning
Linguistic meaning and its role in communication. How diagnostic tests can be used to categorize and separate semantic phenomena such as ambiguity and vagueness, entailment, and presupposition. How basic set theory and logic can be used to specify meanings and explain semantic phenomena. Pragmatic complications involving the assumptions and intentions of language users. 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, Spr (Staff)

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, Spr (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, Aut (Staff)

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 142. Bilingualism, Language Attrition, and Heritage Languages
Linguistic and sociolinguistic aspects of first language loss among emigrants; consequences for language teaching. GER:DB-SocSci

3-4 units, not given this year

LINGUIST 144. Introduction to Cognitive and Information Sciences
(Same as PHIL 190, PSYCH 132, SYMBSYS 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 (Wasow, T; Roberts, E)

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 (Hall-Lew, L)

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 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
(Same as ANTHRO 120.) 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, Aut (Fox, J)

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, Win (Pereltsvaig, A)

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, Aut (Pereltsvaig, A)

LINGUIST 180. From Languages to Information
(Same as CS 124.) 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.

3-4 units, Win (Jurafsky, D)

LINGUIST 182. Human and Machine Translation
(Same as LINGUIST 282.) The process of translation by professional and amateur translators, and by existing and proposed machine-translation systems; what each might learn from the others. Prerequisite: advanced knowledge of a foreign language. GER:DB-EngrAppSci

4 units, not given this year

LINGUIST 183. Computational Theories of Syntax
(Same as LINGUIST 283.) 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, Win (Kay, M)

LINGUIST 187. Grammar Engineering
(Same as LINGUIST 287.) 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, Win (King, T; Kaplan, R)

LINGUIST 188. Natural Language Understanding
(Same as CS 224U, LINGUIST 288.) Machine understanding of human language. Computational semantics (determination of sense, event structure, thematic role, time, aspect, synonymy/meronymy, causation, compositional semantics, treatment of scopal operators), and computational pragmatics and discourse (coherence relations, anaphora resolution, information packaging, generation). Theoretical issues, online resources, and relevance to applications including question answering, summarization, and textual inference. Prerequisites: one of LINGUIST 180, CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

2-4 units, alternate years, 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)

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 (Clark, E)

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

Courses numbered 200 and above are primarily for graduate students, but with consent of instructor some of them may be taken for credit by qualified undergraduates.

LINGUIST 200. Foundations of Linguistic Theory
Theories that have shaped contemporary linguistics; recurrent themes and descriptive practice.

4 units, Aut (Kiparsky, P)

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, Spr (Sumner, M)

LINGUIST 205B. Advanced Phonetics
Prerequisite: LINGUIST 205A.

2-4 units, not given this year

LINGUIST 207. Seminar in Phonetics
Topics vary. 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, not given this year

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 (Kiparsky, P)

LINGUIST 210B. Advanced Phonology
The phonological organization of the lexicon. Topics include lexical phonology, phonological subregularities, gradient phonotactics, and lexical frequency effects.

4 units, not given this year

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, Win (Kiparsky, P)

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 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. Universal properties and typology of morphological categories; proposals towards their principled explanation in a restrictive theory of language.
2-4 units, not given this year

LINGUIST 218. Seminar in Morphosyntax
May be repeated for credit.
2-4 units, not given this year

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, Spr (Sag, I)

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. Empirical Foundations of Syntactic Theory I
Core phenomena of modern syntactic theories from a critical perspective: the role of the verb and lexicon in the determination of sentence syntax. The argument/adjunct distinction, subcategorization and argument structure, motivation for a lexicalist approach, principles governing argument expression, operations on argument structure and grammatical function changing rules, unbounded dependencies, and the approach to unbounded dependencies rooted in principles of lexical expression and subcategorization satisfaction. Readings from classic papers and crosslinguistic perspectives.
2-4 units, Aut (Bresnan, J)

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
Focus is on phrase structure, movement, functional categories, features, the nature of economy conditions, and parametric differences. More general issues of the architecture of the grammar and the nature of crosslinguistic variation.
2-4 units, Win (Pereltsvaig, A)

LINGUIST 224A. Introduction to Formal Universal Grammar
(Same as LINGUIST 124A.) A formal model of universal grammar designed to explain crosslinguistic variation in syntactic structure: nonconfigurationality in Australian aboriginal languages, incorporation in native American languages and the Bantu languages of Africa, scrambling and head movement in European languages. Issues such as universal grammar design, and analytic problems from a variety of natural languages. Prerequisites: introduction to syntax and familiarity with logic or other symbolic systems, or consent of instructor.
4 units, not given this year

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 226. Binding
Comparison of three analyses of binding relations: index analysis, combinator analysis, and copy based analysis. Topics include syntactic binding theory, syntax-semantics interface, scope and binding, reciprocity, ellipsis, de re/de se, agreement, and focus.
1-4 units, Spr (Staff)

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
Meaning in natural language. Topics: elementary set theory; propositional logic, predicate logic, and lambda calculus, and their relation to semantic analysis; model theoretic characterizations of meaning and semantic properties of English conjunctions and determiners. Grice's theory of implicature, speech acts, Davidson's theories of logical form, and Montague grammar. Recommended: elementary logic and set theory.
2-4 units, Win (Peters, S)

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, not given this year

LINGUIST 232B. Seminar in Lexical Semantics
Space and motion in language. May be repeated for credit.
1-4 units, Spr (Clark, E)

LINGUIST 232C. Lexical Semantics Research Seminar
May be repeated for credit. By arrangement.
1-2 units, not given this year

LINGUIST 233. Introduction to Formal Pragmatics
(Same as LINGUIST 133.) 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, Aut (Staff)

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, not given this year

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, Win (Staff)

LINGUIST 236. Seminar in Semantics: Indefinites
Topics vary. Previous topics include static and dynamic approaches to indefinites. 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, Win (Peters, S)

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, Win (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 247. Seminar in Psycholinguistics
(Same as PSYCH 227.) May be repeated for credit.
2-4 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, not given this year

LINGUIST 251. Sociolinguistic Field Methods
Strengths and weaknesses of the principal methods of data collection in sociolinguistics.
4 units, Aut (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 255. Seminar in Sociolinguistics: Variation and Spoken Style
The nature of spoken style. New kinds of variables that play a role in style, the structure of style, and the role of style in the construction of meaning in variation. Project-based. May be repeated for credit.
3-5 units, Win (Eckert, P)

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 260A. Historical Morphology and Phonology
Sound change and analogical change in the perspective of linguistic theory. Internal and comparative reconstruction.
4 units, Spr (Kiparsky, P)

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 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.
3-5 units, Spr (Rickford, J)

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, Aut (Pereltsvaig, A)

LINGUIST 274A. Field Methods I
(Same as ANTHRO 71, LINGUIST 174.) Hands-on. The methods by which linguists gather raw linguistic data about a language and begin analyzing its structure. Working with a speaker of a language not previously studied by class participants, students develop a description of key aspects of its grammar and examine methodologies for obtaining, storing, and manipulating data.
2-4 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 278. Programming for Linguists
Computer programming techniques for collecting and analyzing data in linguistic research. Introduction to the UNIX environment, Perl programming, and other scripting tools. How to gather, format, and manipulate corpus, field, and experimental data; combine data from multiple sources; and create web surveys. Lab. Knowledge of computer programming not required.
2-4 units, Aut (Coppock, E)

LINGUIST 280. 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: CS 121/221 or CS124/LINGUIST 180, CS103, CS109.
3-4 units, Spr (Manning, C)

LINGUIST 281. 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, Win (Jurafsky, D)

LINGUIST 282. Human and Machine Translation
(Same as LINGUIST 182.) The process of translation by professional and amateur translators, and by existing and proposed machine-translation systems; what each might learn from the others. Prerequisite: advanced knowledge of a foreign language.
4 units, not given this year

LINGUIST 283. Computational Theories of Syntax
(Same as LINGUIST 183.) 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, Win (Kay, M)

LINGUIST 285. Finite State Methods in Natural Language Processing
Theory and available technology for finite state language processing. Applications include tokenization, phonological and morphological analysis, disambiguation, and shallow parsing.
3-4 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, Aut (Manning, C; Raghavan, P)

LINGUIST 287. Grammar Engineering
(Same as LINGUIST 187.) 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, Win (King, T; Kaplan, R)

LINGUIST 288. Natural Language Understanding
(Same as CS 224U, LINGUIST 188.) Machine understanding of human language. Computational semantics (determination of sense, event structure, thematic role, time, aspect, synonymy/meronymy, causation, compositional semantics, treatment of scopal operators), and computational pragmatics and discourse (coherence relations, anaphora resolution, information packaging, generation). Theoretical issues, online resources, and relevance to applications including question answering, summarization, and textual inference. Prerequisites: one of LINGUIST 180, CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150).
2-4 units, alternate years, not given this year

LINGUIST 289. Quantitative, Probabilistic, and Optimization-Based Explanation in Linguistics
Capturing the soft constraints inherent in linguistic systems, based on quantitative evidence obtained from linguistic corpora. Computer tools for collecting and modeling data. Emphasis is on syntax.
3-4 units, not given this year

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)

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 (Wasow, T)

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 (Rickford, J)

LINGUIST 395A. Research Workshop I
Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.
1-2 units, Spr (Rickford, J)

LINGUIST 395B. Research Workshop II
Restricted to students in the doctoral program. Student presentations of research toward qualifying papers.
1-2 units, Spr (Wasow, T)

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, 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

For information on graduate programs in the Department of Management Science and Engineering, see the "Management Science and Engineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN MANAGEMENT SCIENCE AND ENGINEERING

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 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, Terrorism, and Energy
Stanford Introductory Seminar. Preference to sophomores. What are nuclear weapons and what do they do? Why do some nations want them? What are the risks of nuclear terrorism? What is radioactivity? What role does nuclear power play? Can it help with global

warming? Emphasis is on policy options in the light of changes in the world. Recommended: a course in international relations, engineering, or physical science. GER:DB-EngrAppSci, 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.

5 units, Win (Bailey, D; Chiu, S; Hausman, W; Katila, R; Shachter, R)

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 (Goel, A), Spr (Van Roy, B)

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, Win (Glynn, P)

MS&E 130. Information Systems and Networks
Technical, social, and economic issues in modern information networks. Introduction to Internet architectures and search technologies. Network economics and the pricing of digital goods. Advertising and marketing models for the Internet. Social interaction in the networked society emphasizing how information systems have altered work and the workplace. Recommendation systems, reputation systems, and information markets. Prequisite: CS 106B or X. GER:DB-EngrAppSci

3 units, Spr (DiPalantino, D)

MS&E 134. Organizations and Information Systems
(Same as MS&E 234.) How information systems impact organizations and how organizations take control of information technology (IT) to gain a competitive edge. Topics include: IT components, architecture, and transformation; the effect of IT on competition; real-time enterprise; leadership; and outsourcing. Student teams perform field studies based on situations in which information technology is creating a significant management problem or business opportunity. Enrollment limited. 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, Win (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 153. Introduction to Decision Making in Organizations
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. GER:DB-EngrAppSci

3 units, Sum (Holtzman, S; Robinson, B)

MS&E 154. Business Strategy and Public Policy Decision Making
Comparative study of how decision makers should formulate, evaluate, and implement strategy or policy in organizations of all sizes. Student teams apply qualitative and quantitative methods to private sector strategies, such as Internet company growth, entrepreneurial start-up, or corporate R&D portfolio, and public

sector policies, such as nuclear nonproliferation, flu pandemic mitigation, and terrorist attack prevention. Topics: right people doing the right thing in the right way; framing key issues and challenges; crafting doable strategies and policies; capturing uncertainties; resolving value dilemmas; analyzing consequences; testing sensitivities; gathering additional information; and committing to action. Not intended for MS&E majors. Recommended: algebra and probability.

3 units, Sum (Robinson, B)

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, Win (Katila, R)

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 (Siino, R)

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.

3 units, Aut (Companys, Y)

MS&E 184. Technology and Work
Interplay between technology and work, emphasizing technological change and its impact on workers at all levels. Technologies include the assembly line, computer and information systems, cardiac surgery techniques, and advanced computational software. Motivations for and consequences of change, including rationalization, deskilling, reskilling, offshoring, and increasing abstraction of work.

3 units, Spr (Bailey, D)

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.

4 units, Spr (Hinds, P)

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 (Hutton, D)

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 (Perry, W; Hecker, S)

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 (Perry, W; Hecker, S)

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, Aut (Huntington, H)

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 (Ye, Y)

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 (Staff)

MS&E 234. Organizations and Information Systems
(Same as MS&E 134.) How information systems impact organizations and how organizations take control of information technology (IT) to gain a competitive edge. Topics include: IT components, architecture, and transformation; the effect of IT on competition; real-time enterprise; leadership; and outsourcing. Student teams perform field studies based on situations in which information technology is creating a significant management problem or business opportunity. Enrollment limited. Prerequisites: CS 106A, 180, or equivalents.

4 units, Win (Tabrizi, B)

MS&E 235. Internet Commerce
The technology, mathematics, and economics of Internet commerce. Topics include: models of Internet commerce; online advertising; product recommendation systems and personalized marketing; pricing and delivery of digital media; web tools; piracy, copyright, and peer-to-peer networks; rating and reviewing of online businesses; and co-evolution of Internet technology and commerce. Hands-on exercises; group project. Prerequisites: 111 or 211, and CS 106B or X.

3 units, Spr (Goel, A), alternate years, not given next year

MS&E 238. Network Structures and Analysis
The role of networks in social, technological, and economic systems. The impact of network structures on systems such as social networks including LinkedIn and Facebook; web pages and hyperlinks; buyers and sellers connected through a market; and towns connected by roads or airplane routes. Topics: graph and network analysis; epidemics on networks, the spread of fads, and tipping points; six degrees of separation and the small world phenomenon; power laws and their emergence; and network effects and externalities. Prerequisites: 220 and MATH 51.

3 units, alternate years, not given this year

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, Win (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 problems, 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 IPER 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: 241 or ECON 50, 51.
3 units, Spr (Sweeney, J)

MS&E 245G. Finance for Non-MBAs
(Same as ECON 135, FINANCE 221.) 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. Limited enrollment; contact academic_operations@gsb.stanford.edu. 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.
4 units, Aut (Admati, A)

MS&E 246. 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, Win (Johari, R)

MS&E 247G. International Financial Management
(Same as FINANCE 323.) With a daily volume of more than $1.8tr the foreign exchange market is by far the largest financial market in the world. It is also one of the most important ones as it is impossible to avoid exchange rate risk in the global economy. We will examine various aspects of the foreign exchange market. First, we will examine the role of governments and central banks. We will then focus on 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. Prerequisite: basic finance theory (equivalent to 242 or 245G).
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. 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 financial crises in E. Asia and Argentina; 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, Aut (De La Grandville, O), 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.
2-3 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. Prerequisite: 250A, consent of instructor. (Paté-Cornell)
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, Win (Veinott, A)

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 255A. 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 255B. Decision Systems II

(Formerly MS&E 452.) Students design a system to help business, consumer, medical, or other decision makers. Previous student teams have designed systems for auction bidding, cancer treatment, sailing tactics, automobile purchasing, network design, Mars exploration, flu treatment, platoon tactics, high-tech manufacturing, and oil-and-gas exploration. No programming required. Satisfies MS&E project course requirement. Prerequisite: 252 or equivalent. Recommended: 255A.

3 units, Spr (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. Analysis of Production and Operating Systems

Businesses add value through production and delivery of products and services; operations managers are responsible for designing, running, and improving systems and processes to meet demand for goods and services. Techniques to analyze an operating system. Topics include determination of optimal facility location, production lot sizing, optimal timing and sizing of capacity expansion, and inventory control. Prerequisites: probability and optimization.

4 units, Aut (Staff)

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 263. Internet-Enabled Supply Chains

E-businesses have changed traditional supply chain interactions by creating a web-like structure and more flexible relationships, and it is no longer possible operationally or strategically to ignore the information-based virtual value chains for any business. How information technologies advanced supply chain integration; e-markets including auctions and exchanges; dynamic pricing; bundling; strategic implications of lock-in and switching costs; compatibility choices; and standardization efforts.

3 units, not given this year

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.

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, Spr (Erhun Oguz, F), alternate years, not given next 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. 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.

3-4 units, Win (Rafinejad, D)

MS&E 267. Supply Chain Risk and Flexibility Management

Methods and analytic tools for quantifying and managing the impact of uncertainty in supply and demand on the operating and financial performance of firms and networks of firms. Design and delivery of products and services to provide competitive differentiation by enabling cost, value, risk and flexibility to be balanced and managed across supply networks. Case study applications by leading companies to procurement, manufacturing, outsourcing, and sales relationships. Tools, processes, and internal crossfunctional coordination required to operationalize approaches in core planning and execution systems and processes. Prerequisite: 262.

3-4 units, Spr (Johnson, B)

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 269. Quality Control and Management

Topics include the cost of quality, inspection, sampling plans, statistical process control, uncertainty in the supply process, Bayesian decision methods, reliability, robust quality, quality function deployment, quality in services, and approaches to quality management. Case studies. Class project involving local industry required for fourth unit. Prerequisites: 120 and STATS 110.

3-4 units, not given this year

MS&E 270. Strategy in Technology-Based Companies

For graduate students only. 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.

4 units, Win (Kosnik, T; Novitsky, D; Ramfelt, L; Smith, L), Spr (Kosnik, T; Novitsky, D; Ramfelt, L; Smith, L)

MS&E 272. Entrepreneurial Finance
Primarily for graduate engineering students. Introduction to the concepts in and around the financing of entrepreneurial companies. Focus is on teaching future general managers how to use financial perspective to make better decisions in entrepreneurial settings, including selecting financial partners, evaluating financing vehicles, and financing companies through all growth stages, from startup through initial public offering. Limited enrollment. Prerequisites: 140 and ENGR 60, or equivalents. Recommended: 242 or 245G.

3 units, Spr (Dearing, M)

MS&E 273. Technology Venture Formation
Open to graduate students interested in high-technology entrepreneurship.The process of starting venture scale high-tech businesses. Assessing opportunities, sizing markets, evaluating sales channels, developing R&D and operations plans, raising venture capital, managing legal issues, and building a team. Teaching team includes entrepreneurs, venture capitalists, and guest speakers. Student teams write a business plan and make a formal presentation to a group of first tier venture capitalists. Enrollment limited. Recommended: 140, 270, 271, 272, or equivalent.

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 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 (Sutton, R), Spr (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, Win (Sutton, R; Dearing, M)

MS&E 285. Negotiation
(Same as CEE 151, CEE 251, ME 207.) Negotiation styles and processes to help students conduct and review negotiations. Workshop format integrating intellectual and experiential learning. Exercises, presentations, live and field examples, and individual and small group reviews. Application required before first day of class; see Coursework.

3 units, Aut (Christensen, S), Spr (Christensen, S)

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, Win (Sutton, R; Dunn, D)

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 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 (Perry, W; Hecker, S)

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)

MS&E 299. Designing A Free Society
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, Aut (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, alternate years, not given this year

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 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, 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, Win (Ye, Y), alternate years, not given next 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. Interior methods. The simplex method. Factorization and updates. The reduced-gradient, augmented Lagrangian, and SQP methods. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108 or 302.

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, alternate years, not given this 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, alternate years, 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, Win (Glynn, P), alternate years, not given next 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, Win (Goel, A), alternate years, not given next 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, Spr (Bambos, N)

MS&E 335. Queuing Systems and 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 338. Advanced Topics in Information Science and Technology
Advanced material in this area is sometimes taught for the first time as a topics course. Prerequisite: consent of instructor.
3 units, 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, Spr (Van Roy, B)

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, Spr (Weber, T)

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, Win (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, Spr (Luenberger, D)

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 (Veinott, A)

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 (Staff)

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, Aut (Veinott, A), alternate years, not given next 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, Spr (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 operating 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, alternate years, not given this year

MS&E 365. Game Theoretic Models in Operations Management
Formal analysis of strategic interactions among decision makers such as suppliers, manufacturers, retailers, and consumers; the resulting dynamics in a market environment. Game theory as the main tool of analysis. Readings primarily from journal articles. May be repeated for credit. Prerequisite: 246 or equivalent.

3 units, Spr (Erhun Oguz, F), alternate years, not given next 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 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 375. Research on Entrepreneurship
Restricted to Ph.D. students. Organization theory, economics, and strategy perspectives. Limited enrollment. Prerequisites: SOC 360 or equivalent, and consent of instructor.

3 units, Aut (Eisenhardt, K)

MS&E 376. Strategy and Organization Doctoral Research Seminar
Current research at the interface of strategy policy and organization theory. Topics vary annually. Limited enrollment. Prerequisites: SOC 360 or equivalent, and consent of instructor.

3 units, not given this year

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, Spr (Bailey, D)

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)

5-6 units, Win (Hinds, P)

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, alternate years, not given this year

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.

1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

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 (Staff)

MS&E 453A. Medical Decision Making Seminar
Decision making models and methods to address complex, uncertain medical decisions. Experts present best practices and research on current topics such as mathematical modeling of bioterrorism, HIV

screening and prevention, flu pandemic interventions, personal medical procedure decisions, and decision support for cancer care delivery.

1 unit, Aut (Robinson, B)

MS&E 453B. Energy Decision Making Seminar
Decision making models and methods to address complex, uncertain energy decisions. Experts present best practices and research on current topics such as traditional versus alternative energy supply, global demand forecasts, mathematical modeling of energy economics, energy policy and consumer behavior, and geopolitical energy considerations.

1 unit, Win (Robinson, B)

MS&E 453C. Environmental Decision Making Seminar
Decision making models and methods to address complex, uncertain environmental decisions. Experts present best practices and research on current topics such as climate change science and policy, mathematical modeling of environmental strategy consequences, marine resource preservation, groundwater contamination, and international agricultural crop decisions.

1 unit, Spr (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 (Staff)

MS&E 455. Decision Making in Organizations
Lectures and war stories from management consultants experienced in applying decision analysis. Student teams critique decisions from news articles, case studies, and interviews with leaders of local organizations. Topics: roles people play, normative versus descriptive approaches, avoiding traps and failure modes, decision process and content quality, biases, expert judgments, economic analysis, creativity, organizational behavior, leadership styles, decision psychology, mutual learning models, advocacy and inquiry, new venture investing, and portfolio evaluation. Recommended corequisite: 252.

2 units, Aut (Robinson, B)

MS&E 456. Decision Analysis Applications
Management consultants reveal behind-the-scenes insights about how decision analysis models and methods are applied to make technically and organizationally complex decisions for private-sector and public-sector organizations. Student teams apply state-of-the-art tools to frame, structure, model, assess, and analyze real examples. Cases discussed: C5 Corvette design, global competition for HDTV market, DRAM manufacturing, movie studio portfolios, pharmaceutical drug development, oil and gas exploration and production, financial derivatives, litigation strategy, electric power regulation, and marine resource preservation. Recommended: 252, 455. Recommended corequisite: 352.

2 units, Win (Robinson, B)

MS&E 457. Decision Analysis Projects
A virtual consulting firm directed by decision analysts. Student teams receive guidance from a mentor as they help local businesses, governments, or other institutions make a current strategy or policy decision. Projects typically include start-up venture funding, R&D portfolio planning, new product 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 or equivalent. Recommended: 352, 455, 456.

3 units, Spr (Robinson, B)

MS&E 458. Professional Decision Consulting: Marketing Services, Delivering Results, and Balancing Lifestyle
Management consultants share lessons about professional services marketing, pricing to value, leading and managing consulting projects, communicating with diverse audiences, and delivering insights that exceed client expectations. What it looks like from inside a consulting firm, the client's view, and the consulting industry perspective. Student teams develop answers to frequently asked questions, prepare marketing materials, and present proposals for consulting services to decision makers in local organizations.

2 units, Aut (Robinson, B)

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, not given this year

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 (Dearing, M; Seelig, T), Win (Dearing, M; Seelig, T), Spr (Dearing, M; Seelig, T)

MS&E 474. Business and Environmental Issues
(Same as GSBGEN 547.) Overlap and synergies between business and environmental fields. Guest speakers from for-profit and nonprofit sectors. Past speakers have included business executives, alternative energy experts, environmental consultants, and professors. Group assignments.

2 units, Spr (Plambeck, E; Sweeney, J)

MS&E 485A. Introduction to Crosscultural Design
Preparation for 485B. Workshop and initial project work in teams.

1 unit, Win (Hinds, P)

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, Spr (Hinds, P)

MS&E 491. Real-World Clean Energy Project Development
Student teams prepare and present a development plan for a clean energy project of their choice, specifying the resource, technology, market, end-use, and policy and regulatory factors. Management plan and financial and economic evaluation. Readings and presentations on topics in clean energy. Guest speakers involved in project development.

3 units, not given this year

MASTER OF LIBERAL ARTS (MLA) COURSES

For information on on the Master of Liberal Arts program, see the "Master of Liberal Arts" section of this bulletin. The MLA program is a unit of the "Continuing Studies Program".

GRADUATE COURSES IN MASTER OF LIBERAL ARTS

Restricted to MLA students.

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, Aut (Robinson, P)

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 (Staff)

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 (Staff)

MLA 102. The Plague: An Introduction to Interdisciplinary Graduate Study
Limited to and required of second-year MLA students. The historical, literary, artistic, medical, and theological issues raised by the plague in history and the present. 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 258. Rome: The City and the World
4 units, Win (Staff)

MLA 259. Terror and Terrorism
4 units, Win (Staff)

MLA 260. Problems in 19th-Century British History, 1850-1918
4 units, Win (Staff)

MLA 261. Latency: Western Literature and Culture after WW II, 1945-1968
4 units, Spr (Staff)

MLA 262. The Economics of Life and Death
4 units, Spr (Staff)

MLA 263. Historical Crisis and Literary Response
Five novels that treat moments of historical crisis and hone in on the human dimension. How literature can represent dimensions of ethics in a time of crisis. The literary style used in each novel to portray key ethical issues at critical historical junctures. Authors include McEwan, Woolf, and Gordimer.
4 units, Spr (Staff)

MLA 264. Shakespeare in Performance XI
How Shakespeare's works and their style, structure, and power are only fully revealed in performance. Students produce a short version of two plays. How a unified interpretation and theatrical style emerges from the collaborative efforts of an entire production team.
4 units, Sum (Staff)

MLA 265. Is Patriotism a Good Thing?
4 units, Sum (Staff)

MLA 266. The Evolution of Darwin
Intellectual and physical milieux, intellectual foundations, and personal characteristics associated with the development of the theory of evolution. Darwin's travels aboard the Beagle and within the UK and the impact these excursions had on his ideas.
4 units, Aut (Staff)

MLA 267. Wicked Witches of the West
Workshop-style seminar. How powerful women are depicted in classical Greek tragedy and Shakespeare. Comparisons of plays. Thematic, textual, and historical issues; theatrical practice. Sources include films if available. Scene and direction work.
4 units, Win (Staff)

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 (Staff), 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.
4 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Paulson, L)

MATERIALS SCIENCE AND ENGINEERING (MATSCI) COURSES

For information on graduate programs in the Department of Materials Science and Engineering, see the "Materials Science and Engineering" and "School of Engineering" sections of this bulletin.

UNDERGRADUATE COURSES IN MATERIALS SCIENCE AND ENGINEERING

MATSCI 70N. Building the Future: Invention and Innovation with Engineering Materials
Stanford Introductory Seminar. Preference to freshmen. The technological importance of materials in human civilization is captured in historical names such as the Stone, Bronze, and Iron Ages. The present Information Age could rightly be called the Silicon Age. The pivotal roles of materials in the development of new technologies. Quantitative problem sets, field trips, and formal presentations of small-group projects. GER:DB-EngrAppSci
5 units, Spr (Bravman, J)

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 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. GER:DB-EngrAppSci
4 units, Aut (Dauskardt, R)

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 (Han, S)

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)

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
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
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
(S,Sem Same as ENGR 159Q.) Stanford Introductory Seminar. 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
4 units, Win (Han, S)

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
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
4 units, Aut (Han, S)

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. GER:DB-EngrAppSci
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
4 units, Aut (Cui, Y)

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
4 units, Aut (Sinclair, R)

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
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
4 units, Win (Clemens, B)

MATSCI 196. Imperfections in Crystalline Solids
(Same as MATSCI 206.) The relation of lattice defects to the physical and mechanical properties of crystalline solids. Introduction to point imperfections and their relationship to transport properties in metallic, covalent, and ionic crystals. Geometric, crystallographic, elastic, and energetic properties of dislocations. Relations between dislocations and the mechanical properties of crystals. The structure and properties of interfaces in solids. Prerequisite: 193/203. GER:DB-EngrAppSci
4 units, Win (Staff)

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
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
4 units, Win (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
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 units, Win (Han, S)

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 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 units, Aut (Han, S)

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 units, Aut (Cui, Y)

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 units, Aut (Sinclair, R)

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 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 units, Win (Clemens, B)

MATSCI 206. Imperfections in Crystalline Solids
(Same as MATSCI 196.) The relation of lattice defects to the physical and mechanical properties of crystalline solids. Introduction to point imperfections and their relationship to transport properties in metallic, covalent, and ionic crystals. Geometric, crystallographic, elastic, and energetic properties of dislocations. Relations between dislocations and the mechanical properties of crystals. The structure and properties of interfaces in solids. Prerequisite: 193/203.
3 units, Win (Staff)

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 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 units, Win (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 properties. Elementary quantum and statistical mechanics concepts are used. Prerequisite: 195/205 or equivalent.
3 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.
3 units, Spr (Heilshorn, S)

MATSCI 230. Materials Science Colloquium
May be repeated for credit.
1 unit, Aut (McGehee, M; Salleo, A), Win (Brongersma, M; Lindenberg, A), Spr (Cui, Y; Heilshorn, S)

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 units, Aut (Dauskardt, R)

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. SITN/SCPD televised.
3 units, Spr (McGehee, M)

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. SITN/SCPD televised.
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. SITN/SCPD televised.
3 units, Win (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), alternate years, not given next year

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. SITN/SCPD televised.
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 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. SITN/SCPD televised.
3 units, Win (McGehee, M; Peumans, P)

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. Sub-wavelength 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 352. Stress Analysis in Thin Films and Layered Composite Media

Introduction to methods of stress analysis of layered dissimilar media, including thin films deposited on substrates, composite laminates, and stratified anisotropic elastic materials based on techniques pioneered by Stroh. Stress states generated by thermal and elastic mismatch and local stress concentrations at interfacial cracks or corners, with applications to integrated circuit devices, aircraft materials, and geophysical media. Prerequisites: introductory course on the strength of materials or the theory of elasticity; familiarity with matrix algebra.

3 units, not given this year

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. SITN/SCPD televised. Prerequisite: 151/251, 198/208, or equivalent.

3 units, Spr (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 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 405. Seminar in Applications of Transmission Electron Microscopy

May be repeated for credit.

1 unit, not given this year

MATHEMATICAL AND COMPUTATIONAL SCIENCE (MCS) COURSES

For information on undergraduate programs in Mathematical and Computational Science, including lists of courses applicable to the major, see the "Mathematical and Computational Science" section of this bulletin.

UNDERGRADUATE COURSES IN MATHEMATICAL AND COMPUTATIONAL SCIENCE

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

For information on undergraduate and graduate programs in the Department of Mathematics see the "Mathematics" section of this bulletin.

UNDERGRADUATE COURSES IN MATHEMATICS

The department offers two sequences of introductory courses in single variable calculus. MATH 41,42 present single variable calculus; differential calculus is covered in the first quarter, integral calculus in the second. MATH 19,20,21 cover the material in 41,42 in three quarters instead of two. There are two options for studying multivariable mathematics. 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 recommended for incoming freshmen with 10 units of advanced placement credit. MATH 51H,52H,53H cover the same material as 51,52,53, but with more emphasis on theory and rigor. The introductory course in linear algebra is 103 or 113. There are no formal prerequisites for these courses, but appropriate mathematical maturity is expected. Much of the material in 103 is covered in the sequence 51,52,53.

MATH 15. Overview of Mathematics

Broad survey of mathematics; its nature and role in society. GER:DB-Math

3 units, not given this year

MATH 19. Calculus

The content of MATH 19, 20, 21 is the same as the sequence MATH 41, 42 described below, but covered in three quarters, rather than two. GER:DB-Math

3 units, Aut (Butscher, A), Win (Staff), Sum (Staff)

MATH 20. Calculus

Continuation of 19. Prerequisite: 19. GER:DB-Math

3 units, Win (Butscher, A), Spr (Staff)

MATH 21. Calculus

Continuation of 20. Prerequisite: 20. GER:DB-Math

4 units, Spr (Butscher, A)

MATH 41. Calculus
Introduction to differential and integral calculus of functions of one variable. Topics: review of elementary functions including exponentials and logarithms, rates of change, and the derivative. Introduction to the definite integral and integration. Prerequisites: algebra, trigonometry. 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 (Lucianovic, M)

MATH 42. Calculus
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 (Staff), 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 (Staff), Win (Lucianovic, M)

MATH 51. Linear Algebra and Differential Calculus of Several Variables
Geometry and algebra of vectors, systems of linear equations, matrices, vector valued functions and functions of several variables, partial derivatives, gradients, chain rule in several variables, vector fields, optimization. Prerequisite: 21, 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 (Staff)

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. GER:DB-Math
5 units, Aut (Tzou, L), Win (Kerckhoff, S), Spr (Brumfiel, G)

MATH 52H. Honors Multivariable Mathematics
Continuation of 51H. Prerequisite: 51H. GER:DB-Math
5 units, Win (Simon, L)

MATH 53. Ordinary Differential Equations with Linear Algebra
Linear ordinary differential equations, applications to oscillations, matrix methods including determinants, eigenvalues and eigenvectors, matrix exponentials, systems of linear differential equations with constant coefficients, stability of non-linear systems and phase plane analysis, numerical methods, Laplace transforms. Integrated with topics from linear algebra (103). Prerequisite: 51. GER:DB-Math
5 units, Aut (Lisi, S), Win (Iyer, G), Spr (Staff), Sum (Staff)

MATH 53H. Honors Multivariable Mathematics
Continuation of 52H. Prerequisite: 52H. GER:DB-Math
5 units, Spr (Brendle, S)

MATH 80Q. Capillary Surfaces: Explored and Unexplored Territory
Stanford Introductory Seminar. Preference to sophomores. Capillary surfaces: the interfaces between fluids that are adjacent to each other and do not mix. Recently discovered phenomena, predicted mathematically and subsequently confirmed by experiments, some done in space shuttles. Interested students may participate in ongoing investigations with affinity between mathematics and physics.
3 units, Win (Finn, 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, Spr (Wieczorek, W)

MATH 88Q. The Mathematics of the Rubik's Cube
Stanford Introductory Seminar. Preference to sophomores. Group theory through topics that can be illustrated with the Rubik's cube: subgroups, homomorphisms and quotient groups, the symmetric and alternating groups, conjugation, commutators, and Sylow subgroups.
3 units, Win (Bump, D)

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, Spr (Milgram, R)

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 (Demanet, L), Win (Liu, T)

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, Win (Nedelec, L), 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, Spr (Kahle, M)

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, WIM
3 units, Aut (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 (Lucianovic, M)

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, Aut (Staff), Win (Cohen, R), Spr (Tzou, L)

MATH 114. Linear Algebra and Matrix Theory II

Advanced topics in linear algebra such as: invariant subspaces; canonical forms of matrices; minimal polynomials and elementary divisors; vector spaces over arbitrary fields; inner products; Jordan normal forms; Hermitian and unitary matrices; multilinear algebra; and applications. Prerequisite: 51H or 113. GER:DB-Math

3 units, Spr (Katznelson, Y)

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 (Toussaint, A), Win (Katznelson, Y), 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 (Li, J)

MATH 118. Mathematics of Computation

Notions of analysis and algorithms central to modern scientific computing: continuous and discrete Fourier expansions, the fast Fourier transform, orthogonal polynomials, interpolation, quadrature, numerical differentiation, analysis and discretization of initial-value and boundary-value ODE, finite and spectral elements. Prerequisites: MATH 51 and 53. GER:DB-Math

3 units, Win (Demanet, L)

MATH 120. Modern Algebra

Basic structures in algebra: groups, rings, and fields. Elements of group theory: permutation groups, finite Abelian groups, p-groups, Sylow theorems. Polynomial rings, principal ideal domains, unique factorization domains. GER:DB-Math, WIM

3 units, Aut (Vakil, R), Spr (Soundararajan, K)

MATH 121. Modern Algebra II

Continuation of 120. Fields of fractions. Solvable and simple groups. Elements of field theory and Galois theory. Prerequisite: 120. GER:DB-Math

3 units, Win (Staff)

MATH 131M. Partial Differential Equations I

More theoretical version of MATH 131P; suitable for Mathematics majors and mathematically inclined Physics majors . Topics include first order equations, physical and mathematical sources of PDE's, method of characteristics, D'Alembert's formula, maximum principles, heat kernel, Duhamel's principle, separation of variables, and Fourier series. Introduction to PDE in multiple space dimensions. Emphasis is on a mathematically rigorous treatment of the subject. Students may not take both 131M and 131P. Prerequisite: 53. GER:DB-Math

3 units, Win (Schoen, R)

MATH 131P. Partial Differential Equations I

A more applied version of MATH 131M; 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 may not take both 131M and 131P. Prerequisite: 53. GER:DB-Math

3 units, Aut (Iyer, G)

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: 131M or 131P (formerly 131). GER:DB-Math

3 units, Spr (Nedelec, L)

MATH 135. Nonlinear Dynamics and Chaos

Topics: one- and two-dimensional flows, bifurcations, phase plane analysis, limit cycles and their bifurcations. Lorenz equations, fractals and strange attractors. Prerequisite: 51 and 53 or equivalent. GER:DB-Math

3 units, not given this year

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 (Ross, K)

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, Win (Eliashberg, Y)

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 (Nedelec, L)

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, Spr (Li, J)

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, Win (Ionel, E)

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, Spr (Staff), 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 (Diaconis, P), 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 (Carlsson, G)

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; Lagrange's theorem and its applications; quadratic residues; introduction to the theory of binary quadratic forms. 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, 121. GER:DB-Math
3 units, Win (Conrad, B), alternate years, not given next year

MATH 155. Analytic Number Theory
Topics 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 156. Group Representations
Group representations and their characters, classification of permutation group representations using partitions and Young tableaux, group actions on sets and the Burnside ring, and spherical space forms. Applications to geometric group actions and to combinatorics. Prerequisites: linear algebra (51 and 53, or 103 or 113) and group theory (109 or 120). GER:DB-Math
3 units, Spr (Staff)

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, Spr (Kahle, M)

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.
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. GER:DB-Math, WIM
3 units, Aut (Ryzhik, L), 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 (Iyer, G)

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 ODE's 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 (Toussaint, A)

MATH 197. Senior Honors Thesis
1-6 units, Aut (Staff), Win (Staff), Spr (Staff)

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 (Ryzhik, L)

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 205C. Real Analysis
Continuation of 205B.
3 units, Spr (Katznelson, Y)

MATH 210A. Modern Algebra
Groups, rings, and fields; introduction to Galois theory. Prerequisite: 120 or equivalent.
3 units, Aut (Milgram, R)

MATH 210B. Modern Algebra
Galois theory. Ideal theory, introduction to algebraic geometry and algebraic number theory. Prerequisite: 210A.
3 units, Win (Brumfiel, G)

MATH 210C. Modern Algebra
Continuation of 210B. Representations of groups and noncommutative algebras, multilinear algebra.
3 units, Spr (Bump, D)

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 (Galatius, S)

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 (Cohen, R)

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.

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 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, Win (Schoen, R)

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, Spr (Brendle, S)

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 (Nolen, J)

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 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 228A. Ergodic Theory
Measure preserving transformations and flows, ergodic theorems, mixing properties, spectrum, Kolmogorov automorphisms, entropy theory. Examples. Classical dynamical systems, mostly geodesic and horocycle forms on homogeneous spaces of SL(2,R). May be repeated for credit. Prerequisites: 205A,B.

3 units, not given this year

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 (Diaconis, P)

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 (Dembo, A)

MATH 230C. Theory of Probability
(Same as STATS 310C.) Infinitely divisible laws. Continuous time martingales, random walks and Brownian motion. Invariance principle. Markov and strong Markov property. Processes with stationary independent increments. 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, Aut (Diaconis, P)

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, Win (Dembo, A)

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, Spr (Staff)

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, Win (Staff)

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, Win (Katznelson, Y)

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 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 (Toussaint, A)

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, Spr (Toussaint, A)

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, Spr (Kerckhoff, S)

MATH 245A. Topics in Algebraic Geometry: Moduli Theory
Intersection theory on the moduli spaces of stable curves, stable maps, and stable vector bundles. May be repeated for credit.
3 units, not given this year

MATH 245B. Topics in Algebraic Geometry: Dessin d'Enfants
Grothendieck's theory of dessin d'enfants, a study of graphs on surfaces and their connection with the absolute Galois group of the rational numbers. Belyi's theorem, representations of the absolute Galois group as automorphisms of profinite groups, Grothendieck-Teichmuller theory, quadratic differentials, and the combinatorics of moduli spaces of surfaces. May be repeated for credit.
3 units, not given this year

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, Win (Diaconis, P)

MATH 248. Algebraic Number Theory
Introduction to modular forms and L-functions. May be repeated for credit.
1-3 units, not given this year

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, Aut (Conrad, B)

MATH 249A. Introduction to Modular Forms
The analytic theory of holomorphic and non-holomorphic modular forms and associated L-functions. Topics include Hecke operators, L-functions, Weil's converse theorem, trace formulas, sub-convexity for L-functions and applications, and Selberg's eigenvalue conjecture. May be repeated for credit. Prerequisites: 205A,B,C, or comparable knowledge of analysis.
3 units, Aut (Soundararajan, K)

MATH 249B. Topics in Number Theory: Class Field Theory
Classification of abelian extensions of local and global fields; classical, adelic, and cohomological formulations; applications to L-functions. May be repeated for credit.
3 units, Win (Conrad, B)

MATH 249C. Topics in Number Theory: Class Field Theory and the Langlands Conjectures
3 units, Spr (Staff)

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 (Vasy, A)

MATH 256B. Partial Differential Equations
Continuation of 256A.
3 units, Win (Liu, T)

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, Win (White, B)

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 (Staff)

MATH 264. Matrix Valued Spherical Functions and Orthogonal Polynomials
Theory of spherical functions on locally compact groups and on Lie groups. Families of orthogonal polynomials with respect to a weight matrix function on the real line, and the corresponding algebra of differential operators. Spherical functions associated to the complex projective space as orthogonal polynomials. Topics may include some applications to quasi birth and death processes. My be repeated for credit. Prerequisities: 114, 205A, and 217A.
3 units, Aut (Staff)

MATH 266. Computational Signal Processing and Wavelets
Theoretical and computational aspects of signal processing. 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 269A. Affine Complex Manifolds and Symplectic Geometry
Plurisubharmonic functions and pseudoconvexity: geometric theory. Construction of pseudoconvex shapes. Complex analysis on Stein manifolds. Symplectic geometry of Stein manifolds. Existence theorem for Stein complex manifolds. May be repeated for credit.
3 units, Aut (Eliashberg, Y)

MATH 269B. Affine Complex Manifolds and Symplectic Geometry
Symplectic convexity and Weinstein manifolds. Symplectic topology of subcritical Weinstein manifolds. From Weinstein to Stein structure. Morse-Smale theory for plurisubharmonic functions on Stein manifolds. Deformation theory for Stein complex structures. Symplectic field theory of Weinstein manifolds. 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, Win (Li, J)

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, Spr (Eliashberg, Y)

MATH 272A. Topics in Partial Differential Equations
3 units, Aut (Tzou, L)

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 (Kerckhoff, S)

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 (Carlsson, G)

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 (Milgram, R)

MATH 284A. Geometry and Topology in Dimension 3
The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.
3 units, Win (Staff)

MATH 284B. Geometry and Topology in Dimension 3
The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.
3 units, Spr (Staff)

MATH 286. Topics in Differential Geometry
May be repeated for credit.
3 units, Win (Mazzeo, R), Spr (Schoen, R)

MATH 290B. Finite Model Theory
(Same as PHIL 350B.) Classical model theory deals with the relationship between formal languages and their interpretation in finite or infinite structures; its applications to mathematics using first-order languages. The recent development of the model theory of finite structures in connection with complexity classes as measures of computational difficulty; how these classes are defined within certain languages that go beyond first-order logic in expressiveness, such as fragments of higher order or infinitary languages, rather than in terms of models of computation.
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: PHIL160A,B, and MATH 161, or equivalents.
3 units, not given this year

MATH 292B. Set Theory
(Same as PHIL 352B.) 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: PHIL160A,B, and MATH 161, or equivalents.
3 units, not given this year

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 355. Graduate Teaching Seminar
Required of and limited to first-year Mathematics graduate students.
1 unit, Spr (Staff)

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.
1-3 units, Aut (Staff), Win (White, B), Spr (Kerckhoff, S), Sum (Staff)

MATH 380. Seminar in Applied Mathematics
Guest speakers on recent advances in applied mathematics.May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (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 386. Mathematics Colloquium
Guest speakers on recent advances in mathematics. May be repeated for credit.
1 unit, Aut (Staff), Win (Bump, D), Spr (Staff)

MATH 387. Seminar in Number Theory
May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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, Spr (Mints, G; Feferman, S)

MATH 395. Classics in Geometry and Topology
Original papers in geometry and in algebraic and geometric topology. May be repeated for credit.
3 units, Aut (Brumfiel, G), Win (Staff), Spr (Cohen, R)

MATH 396. Graduate Progress
Results and current research of graduate and postdoctoral students. May be repeated for credit.
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

MATH 397. Physics for Mathematicians
Topics from physics essential for students studying geometry and topology. Topics may include quantum mechanics, quantum field theory, path integral approach and renormalization, statistical mechanics, and string theory. May be repeated for credit.
1 unit, Win (Staff)

MECHANICAL ENGINEERING (ME) COURSES

For information on graduate programs in the Department of Mechanical Engineering, see the "Mechanical Engineering" and "School of Engineering" sections of this bulletin.

MECHANICAL ENGINEERING COURSE CATALOG NUMBERING SYSTEM

The department uses the following course numbering system:

10- 99	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

UNDERGRADUATE COURSES IN MECHANICAL ENGINEERING

Lab sections in experimental engineering are assigned in groups. If the lab schedule permits, students are allowed, with due regard to priority of application, to arrange their own sections and lab periods. Enrollment with the instructor concerned, on the day before instruction begins or the first day of University instruction, is essential in order that the lab schedule may be prepared. Enrollment later than the first week is not permitted.

ME 10N. Form and Function of Animal Skeletons
Stanford Introductory Seminar. Preference to freshmen. The biomechanics and mechanobiology of the musculoskeletal system in human beings and other vertebrates on the level of the whole organism, organ systems, tissues, and cell biology. Field trips to labs. GER:DB-EngrAppSci
3 units, Win (Carter, D)

ME 17N. Robotics Imitating Nature
Stanford Introductory Seminar. Preference to freshmen. The dream of constructing robots that duplicate the functional abilities of humans and/or other animals has been promulgated primarily by science fiction writers. But biological systems provide models for the designers of robots. Building electromechanical devices that perform locomotory and sensing functions similar to those of an animal as a way of learning about how biological systems function. Walking and running machines, and the problem of giving a robot the capability to respond to its environment. GER:DB-EngrAppSci
3 units, Spr (Waldron, K)

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. Preference to freshmen. Techniques designers use to create innovative solutions across domains. Project-based. Emphasis is on 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. The pleasures of creative design and hands-on development of tangible solutions.
3 units, Aut (Banerjee, S)

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 (Cappelli, M), Spr (Santiago, J)

ME 80. Mechanics of Deformable Bodies
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
3 units, Aut (Levenston, M), Spr (Pruitt, B)

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 (Staff), Win (Staff), Spr (Staff)

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 (Burnett, W)

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 (Staff), Win (Staff), Spr (Staff)

ME 110B. Advanced Design Sketching

Freehand sketching, rendering, design development, and some computer use, guided by instructors. Concurrent assignments in 116 provide subject matter. Prerequisite: 110A or consent of instructor based on drawing skill.

1 unit, not given this year

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

Goal is to create designs and models of new mechanical devices. Design is experienced by students as they work on a team design project obtained from industry or other organizations. Prerequisites: 80, 101, 112. GER:DB-EngrAppSci

4 units, Spr (Waldron, K)

ME 115A. Introduction to Design Methods

Lecture/lab. Problem finding and 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: 101.

3 units, Win (Staff)

ME 115B. Human Values in Design

Lecture/lab. Problem finding, problem solving, intermediate creativity methods, and techniques for researching and presenting product concepts. Individual- and team-based design projects emphasizing advanced visual thinking and prototyping skills. Prerequisite: 115A GER:DB-EngrAppSci

3 units, Spr (Lee, M; Wong, A)

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 (Staff)

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. GER:DB-EngrAppSci

3-4 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 (Asheghi, M)

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, not given this year

ME 161. Dynamic Systems

(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, Spr (McGinn, R)

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.

1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

ME 196. Design and Manufacturing Forum

(Same as ME 396.) Guest speakers address issues of interest to design and manufacturing engineers. Sponsored by Stanford Engineering Club for Automation and Manufacturing (SECAM). May be repeated for credit

1 unit, Win (Reis, R), Spr (Reis, R)

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, Aut (Delp, S)

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

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
Prototype development techniques as an intrinsic part of the design process. Machining, welding, and casting. Manufacturing processes. Design aspects developed in an individual term project chosen, designed, and fabricated by students. Labs, field trips. Undergraduates majoring in Mechanical Engineering or Product Design must take course for 4 units. Limited enrollment with consent of instructor. Corequisite: 103D or CAD experience. Corequisite for WIM for Mechanical Engineering and Product Design majors: ENGR 102M. Recommended: 101.
4 units, Aut (Beach, D), Win (Beach, D)

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
(Same as OIT 333.) Bass Seminar. 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 challenges 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://extreme.stanford.edu.
4 units, Win (Patell, J; Beach, D)

ME 206B. Entrepreneurial Design for Extreme Affordability
(Same as OIT 334.) Bass Seminar. 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 challenges 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://extreme.stanford.edu.
4 units, Spr (Patell, J; Beach, D)

ME 207. Negotiation
(Same as CEE 151, CEE 251, MS&E 285.) Negotiation styles and processes to help students conduct and review negotiations. Workshop format integrating intellectual and experiential learning. Exercises, presentations, live and field examples, and individual and small group reviews. Application required before first day of class; see Coursework.
3 units, Aut (Christensen, S), Spr (Christensen, S)

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 electro-mechanical 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 (Messana, M; Ohline, R)

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 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 (Barry, M; 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.
4 units, Spr (Burnett, W; Howard, R)

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 (Staff)

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 (Bishop, S; Boyle, D)

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, Win (Schox, J)

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, Win (Pitsch, H)

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 (Prinz, F)

ME 261. Dynamic Systems
(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
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: 80, or Human Biology core, or Biology core.

3 units, Spr (Carter, D)

ME 284A. Cardiovascular Bioengineering
(Same as BIOE 284A.) Via Internet. 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.) Via Internet. Continuation of ME 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 287. Soft Tissue Mechanics
Structure/function relationships and mechanical properties of soft tissues, including nonlinear elasticity, viscoelasticity, and poroelasticity. Undergraduates require consent of instructor.

3 units, Win (Levenston, M)

ME 289. Biomechanical Engineering Research Semiar
BME research conducted at Stanford for incoming students. Graduate students and postdoctoral fellows present research emphasizing motivation of research questions, project design, methods, and preliminary results.

1 unit, not given this year

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 (Staff)

ME 297. Forecasting the Future of Engineering
Goal is to develop a 25-year forecast of the future of engineering including the challenges engineers are likely to be asked to solve, and how engineers can be prepared to meet these challenges. Students prepare a long-range forecast of a specific science/engineering sector and a proposed initiative tying new engineering capabilities with global challenges.

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, 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.) Solving matrix-vector systems. Direct and iterative solvers for non-singular linear systems of equations; their accuracy, convergence properties, and computational efficiency. Under- and over-determined systems, and nonlinear systems of equations. Eigenvalues, eigenvectors, and singular values; their application to engineering problems. Concepts such as basis, linear independence, column space, null space, rank, norms and condition numbers, projections, and matrix properties. Recommended: familiarity with computer programming; mathematics background equivalent to MATH 103, 130.

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 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 (Moin, P)

ME 304. 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 Joint Product in Design graduate students.

1 unit, Win (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 inter-relationships; 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. Recommended: 80, or equivalent in structural and/or solid mechanics; some exposure to principles of heat transfer.

3 units, Spr (Kuhl, E)

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.

5 units, Aut (Leifer, L; Cutkosky, M)

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.

5 units, Win (Leifer, L; Cutkosky, M)

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.

5 units, Spr (Leifer, L; Cutkosky, M)

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
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)

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 (Banerjee, S; Burnett, W; Kelley, D; Barry, M)

ME 316B. Product Design Master's Project
Continuation of 316A.

2-4 units, Win (Banerjee, S; Burnett, W; Barry, M; Kelley, D)

ME 316C. Product Design Master's Project
Continuation of 316B.

2-4 units, Spr (Banerjee, S; Burnett, W; Kelley, D; Barry, M)

ME 317A. Design for Manufacturability: Product Definition for Market Success
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 (Ishii, K)

ME 317B. Design for Manufacturability: Quality by Design for Customer Value
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 (Ishii, 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 (Staff), Win (Staff), Spr (Staff)

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, Win (Roth, B)

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. Analytical 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, Aut (Gerdes, C)

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 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. (Niemever)

3 units, not given this year

ME 329. Physical Solid Mechanics
Quantum mechanics, statistical mechanics, and solid state physics for engineering students. The theory describes physical processes at nanoscale in solid materials. Atomic structures of solids and their electronic structures. Statistical mechanics provides a theoretical framework for thermodynamics to connect the nanoscale processes to macroscopic properties of solids.

3 units, alternate years, 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, Aut (Roth, B)

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, Win (Mitiguy, P)

ME 331B. Advanced Dynamics
(Same as AA 242B.) Formulation of equations of motion with Newton/Euler equations; angular momentum principle; D'Alembert principle; power, work, and energy; Kane's method; and Lagrange's equations. Numerical solutions of nonlinear algebraic and dfferential equations govering the behavior of multiple degree of freedom systems. Computed torque control.

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. (Lew)

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 elliptic 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. Active column equation solver, assembly of equations, and element routines. 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. Introduction to Boundary Element Analysis
The boundary integral equation and boundary element method with applications to potential theory and elastostatics. Green's function methods for transforming partial differential equations to integral equations with boundary conditions built in. Implementation of the method and treatments of weakly and strongly (Cauchy principal values) singular kernels. Coupling with finite element methods. Additional topics may include fracture mechanics, contact mechanics, and transient diffusion.

3 units, Spr (Pinsky, P)

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, not given this year

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 (Kuhl, E)

ME 339. 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. (Jacobs)

3 units, Aut (Kuhl, E)

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. Numerical exercises using Matlab. Applications to defects in solids, thin films, and biomembranes.

3 units, Spr (Cai, W)

ME 340B. Elasticity in Microscopic Structures
Elasticity theory and applications to structures in micro devices, material defects, and biological systems. Theoretical basis: stress, strain, and energy; equilibrium and compatibility conditions; boundary value problem formulation. Solution methods: stress function, Green's function, and Fourier transformation; moderate numerical exercises using Matlab. Methods and solutions applied to the elastic behaviors of thin films and MEMS structures, cracks and dislocations, and cell filaments and membranes.

3 units, not given this year

ME 341. Biomechanics of Hearing, Speech, and Balance
Theory and practice of building mathematical models to understand physical phenomena; integration of imaging, physiology, and bio-mechanics. 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.

1-2 units, not given this year

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 344A. Computational Nanotechnology
Atomistic simulations as computational tools to design nanoscale materials and devices. Nanoparticles and nanowires introduced as main classes of nano building blocks. Computational modeling of carbon nanomaterials (fullerenes and nanotubes); nanoparticles and quantum dots; semiconductor and metal nanowires; and molecular wires. Atomistic modeling programs with graphical user interface used to gain hands-on experience of nanomaterials design.

3 units, not given this year

ME 344B. Nanomaterials Modeling
Atomistic and quantum mechanical simulation methods. Focus is quantum simulation of nanomaterials. Review of concepts and practical techniques of atomistic simulations; finite difference algorithms and practical computational issues for molecular dynamics and Monte Carlo simulations. Graphical user interface, designing nanomaterials through analysis and feedback processes, configuration optimization, dynamic mode analysis, and electronic structure analysis. Hands-on experience in computational design of nanomaterials, and fundamentals of simulations.

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, multi-axial 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, not given this year

ME 346A. Introduction to Statistical Mechanics
Concepts and tools of classical statistical mechanics and applications to molecular systems. Thermodynamics and probability theory. Statistical ensembles. Information and entropy. Free energy and transition between metastable states. Brownian motion, Langevin dynamics, and Fokker-Planck equation. Non-equilibrium systems: correlation and response functions, fluctuation-dissipation theorem. Applications to self-assembly, thin film growth, and structural transformation.

3 units, Win (Staff)

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, not given this year

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. Other methods of stress and strain determination (optical fiber strain sensors, thermoelasticity, Moire, residual stress determination).

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, not given this year

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, Win (Pitsch, H)

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
Governing equations. Averaging and correlations. Reynolds equations and Reynolds stresses. Free shear flows, turbulent jet, turbulent length and time scales, turbulent kinetic energy and kinetic energy dissipation, and kinetic energy budget. Kolmogorov's hypothesis and energy spectrum. Wall bounded flows, channel flow and boundary layer, viscous scales, and law of the wall. Turbulence modeling, gradient transport and eddy viscosity, mixing length model, two-equation models, Reynolds-stress model, and large-eddy simulation.

3 units, Spr (Pitsch, H)

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, Spr (Cappelli, M)

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 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, OIT 581.) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.

2 units, Win (Yock, P; Zenios, S; Brinton, T; Milroy, C)

ME 368B. Biodesign Innovation: Concept Development and Implementation
(Same as BIOE 374B, MED 272B, OIT 583.) 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.

2 units, Spr (Yock, P; Zenios, S; Brinton, T; Milroy, C)

ME 369A. Biodesign Innovation, Project A
(Same as BIOE 375A, MED 273A, OIT 582.) Interdisciplinary student teams select a medical need, characterize it fully, develop a needs statement, invent potential conceptual approaches to solving the need, and pursue initial prototyping and planning for regulatory and reimbursement pathways. Guest experts. Corequisite: MED 272A/BIOE 374A/ME 368A/OIT 581.

2 units, Win (Yock, P; Zenios, S; Milroy, C; Brinton, T)

ME 369B. Biodesign Innovation, Project B
(Same as BIOE 375B, MED 273B, OIT 584.) Interdisciplinary teams select the most promising invention from BIOE 375A and move into prototyping and project planning. Teams develop strategies for patenting, FDA submission, third-party reimbursement, licensing agreement or launching a start-up, including cash forecasting and business plan. Prerequisites: MED 375A/ME 369A/BIOE 375A/OIT 582. Corequisite: MED 272B/ME 368B/BIOE 374B/OIT 583.

2 units, Spr (Yock, P; Milroy, J; Brinton, T; 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.
4 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 multi-component 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. Experiences in Innovation and Design Thinking
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, rapid prototyping, team dynamics, storytelling, and project management. 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 (Kembel, G), Win (Kembel, G), Spr (Kembel, G)

ME 377A. Experiences in Innovation and Design Thinking
Design processes, innovation methodologies, need finding, human factors, rapid prototyping, team dynamics, storytelling, and project management. Preparation for real-world innovation and other d.school projects. Hands-on exercises and team projects focusing on process, frameworks, and methods.
2-3 units, not given this year

ME 377B. Experiences in Innovation and Design Thinking
Design processes, innovation methodologies, need finding, human factors, rapid prototyping, team dynamics, storytelling, and project management. Preparation for real-world innovation and other d.school projects. Hands-on exercises and team projects focusing on process, frameworks, and methods.
2-3 units, not given this year

ME 377C. Experiences in Innovation and Design Thinking
Design processes, innovation methodologies, need finding, human factors, rapid prototyping, team dynamics, storytelling, and project management. Preparation for real-world innovation and other d.school projects. Hands-on exercises and team projects focusing on process, frameworks, and methods.
2-3 units, not given this year

ME 381. Orthopaedic Bioengineering
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, not given this year

ME 382A. Medical Device Design
Real world problems and challenges of biomedical device design and evaluation. Students engage in industry sponsored projects resulting in new designs, physical prototypes, design analyses, computational models, and experimental tests, gaining experience in: the formation of design teams; interdisciplinary communication skills; regulatory issues; biological, anatomical, and physiological considerations; testing standards for medical devices; and intellectual property.
4 units, Win (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, Spr (Andriacchi, T)

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 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.
1-5 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 (Staff)

ME 394. Design Forum
Introduction to the design faculty and research labs. Faculty describe their work and research interests followed by open discussion.
1 unit, not given this year

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 (Pruitt, B), Win (Pruitt, B; Kuhl, E), Spr (Kuhl, E)

ME 396. Design and Manufacturing Forum
(Same as ME 196.) Guest speakers address issues of interest to design and manufacturing engineers. Sponsored by Stanford Engineering Club for Automation and Manufacturing (SECAM). May be repeated for credit
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; Mabogunje, A; Sonalkar, N), Win (Leifer, L; Mabogunje, A), Spr (Leifer, L; Mabogunje, A)

ME 398. 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, Win, Spr (Levenston, M)

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 ordinary and 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
The art, science, and practice of design innovation. Tools such as critical foresight and anticipatory research design thinking 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. Prerequisite: consent of instructor.
1-5 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 410X. Foresight Project Experience with Corporate Partners
Participation in a global foresight research team with real-world industrial partners. Foresight and anticipatory research developed become part of the student's portfolio. May be repeated for credit. Limited enrollment. Prerequisite: consent of instructor.
1-5 units, Aut (Leifer, L; Cockayne, W), Win (Leifer, L; Cockayne, W), Spr (Leifer, L; Cockayne, W), Sum (Leifer, L; Cockayne, W)

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, Win (Lew, A)

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, Spr (Prinz, F)

ME 414. Solid State Physics Issues for Mechanical Engineering Experiments
Principles of statistical mechanics, quantum mechanics, and solid-state physics. Provides graduate mechanical engineering students with understanding needed to work on devices or technologies which rely on solid-state physics.
3 units, Sum (Kenny, T)

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 (Ishii, K)

ME 420. Applied Electrochemistry: Micro- and Nanoscale
Concepts of physical chemistry such as thermodynamic equilibrium, reaction kinetics, and mass transport mechanisms from which the fundamentals of electrochemistry are derived. Theory of electrochemical methods for material analyses and modifications with emphasis on scaling behaviors. Electrochemical devices such as sensors, actuators, and probes for scanning microscopes, and their miniaturization concepts. Examples of these devices built, characterized, and applied in labs using technologies such as scanning probe techniques. Projects focus on current problems in biology, material science, microfabrication, and energy conversion.
3 units, not given this year

ME 421. Thought Leaders Seminar for European Entrepreneurship and Innovation
Real-world experiences and challenges in startups, corporations, universities, nonprofit research institutes, and government ministries and agencies. Speakers include entrepreneurs, leaders from global technology companies, university researchers, venture capitalists, legal experts, senior policy makers, and European guests. May be repeated for credit.
1 unit, Win (Leifer, L; Lee, B), Spr (Leifer, L; Lee, B)

ME 438. Computational Molecular Modeling Project
Project-based class. Topics for projects include parallel methods for molecular dynamics, multiple time stepping algorithms, free energy computation, molecular pathways analysis, long-time scale behavior of numerical integrators, and multigrid based fast electrostatic algorithms. Students can propose their own projects. Final report and oral presentation. May be repeated for credit.
3 units, Sum (Darve, E)

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
Topics: kinematics (analysis of deformation, critical points and flow topology, Helmholtz decomposition); constitutive relations (viscous and visco-elastic flows, non-inertial frames); vortex dynamics; circulation theorems, vortex line stretching and rotation, vorticity

generation mechanisms, vortex filaments and Biot-Savart formula, local induction approximation, impulse and kinetic energy of vortex systems, vorticity in rotating frame. Prerequisite: graduate courses in compressible and viscous flow.

3 units, 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, 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 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, not given this year

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, Win (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. Undergraduates register for 168; master's students for 268; doctoral students for 368.) Project-based course involves small groups designing and implementing an experiment concerning voice and agent user interfaces. Each group is involved in a different, publishable research project. May be repeated for credit. Prerequisite: consent of instructor.

1-5 units, Win (Nass, C), Spr (Nass, C)

ME 469A. Computational Methods in Fluid Mechanics

Finite volume methods on stuctured and unstructured grids. Advanced methods for the solution of systems of equations. ADI schemes, preconditioned conjugate gradient and generalized minimum residual algorithms, multigrid methods, and deferred-correction approaches. Projection, fractional step, and artificial compressibility methods. Turbulent flows: direct numerical simulation, large eddy simulation, and Reynolds-averaged Navier-Stokes methods. Prerequisite: ME 300C/CME 206 or equivalent.

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 (Iaccarino, G)

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, Aut (Pitsch, H)

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, Spr (Figueroa Alvarez, C)

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, Spr (Delp, S)

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 500. Thesis (Ph.D.)

2-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MEDICINE (MED) COURSES

See the "School of Medicine" section of this bulletin for more information. The following courses are available to undergraduates or graduate students. Other courses may be available; see http://www.med.stanford.edu/education for more information.

UNDERGRADUATE COURSES IN MEDICINE

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, Spr (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

(F,Dial) Stanford Introductory Seminar. 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, Win (McConnell, M)

MED 87Q. Women and Aging

(S,Sem Same as HUMBIO 87Q.) Stanford Introductory Seminar. Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. GER:EC-Gender

5 units, Win (Winograd, 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? Optional observation of instructors in their medical practices.

3 units, Aut (Croke, J; Jones, H)

MED 93Q. The AIDS Epidemic: Biology, Behavior, and Global Responses

Stanford Introductory Seminar. Preference to sophomores. How the discovery of the causative agent and the modes of transmission of HIV fueled a quest for prevention, treatments, and a vaccine. Discoveries in biology, biotechnology, epidemiology, and medicine during the last 20 years. Hypotheses about the origins of HIV as a human disease; the spread of AIDS and HIV; social, political, and economic consequences of the epidemic; and national and global responses.

3 units, Aut (Katzenstein, D)

MED 94Q. Hormones, Health, and Disease

Preference to sophomores. Hormones' roles in maintaining health; how abnormalities in hormones cause disease. Topics include: the pituitary, the master gland; thyroid hormones and metabolism; insulin and diabetes; adrenal steroids and hypertension; vitamin D, parathyroid hormone, calcium, and osteoporosis; sex hormones, birth control, pregnancy, and menopause; androgens, erectile dysfunction, and athletic performance; cholesterol, obesity, and cardiovascular risk. Recommended: background in human biology and physiology.

3 units, not given this year

MED 108Q. Human Rights and Health

Stanford Introductory Seminar. Preference to sophomores. History of human-rights law. Topics such as: the health status of refugees and internally displaced persons; child labor; trafficking in women and children; torture; poverty, the environment, and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. International conventions on human rights as background for social and political changes that could improve the health of groups and individuals. Optional opportunities to observe at sites where human rights and health are issues.

3 units, Win (Laws, A)

MED 118Q. Pathophysiology of Coronary Heart Disease

Preference to sophomores. Known factors promoting the atherosclerotic process, and the pathologic changes that characterize clinical coronary artery disease. The development of arterial disease and the consequences of coronary occlusion, including heart attack, cardiac rhythm disturbance, and congestive heart failure. Treatment modalities such as cardiac medications, coronary surgery, and angioplasty.

3 units, not given this year

MED 120Q. Pathophysiology and Treatment Aspects of Diseases of the Heart and Blood Vessels

Preference to sophomores. Anatomic, physiologic, and pathologic states that comprise the discipline of cardiovascular medicine. Anatomy and physiology of the heart and blood vessels as an introduction to pathologic states such as heart attack, stroke, congestive heart failure, rhythm disturbances of the heart, and sudden cardiac death. Underlying principles of diagnosis and treatment of the disease.

3 units, not given this year

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, Win (Kiernan, M; Fortmann, S)

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; Fox, E), Win (Gesundheit, N; Fox, E), Spr (Gesundheit, N; Fox, E)

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 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 (Lowe, A; Milroy, J)

MED 227. Bedside Ultrasound
For pre-clinical or clinical medical students, and others with permission. Uses of ultrasound (US) at the bedside. Portable US machines (now the size of laptop computers) are used. How to identify the normal anatomy of the heart, abdomen, and pelvis using US. As proficiency increases, patients with abnormal physical findings are examined at the bedside, enabling students to compare the traditional physical examination with information obtained during US. The syllabus, Introduction to the Physical Examination with Diagnostic Ultrasound (2001), written by Drs. Wolfe and Thompson is used as the students' guide.
1 unit, Aut (Thompson, N; Liang, D), Win (Thompson, N; Liang, D), Spr (Thompson, N; Liang, D)

MED 228. Physicians and Social Responsibility
Social and political context of the roles of physicians and health professionals' role in social change; policy, advocacy, and shaping public attitudes. How physicians have influenced governmental policy on nuclear arms proliferation; environmental health concerns; domestic violence; health and human rights; physicians in government; activism through research; the effects of poverty on health; and gun violence.
1 unit, Aut (Laws, A)

MED 230. Rethinking International Health
(Same as HRP 240.) Issues and players that shape international 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 leaders in international health.
2-3 units, Spr (Parsonnet, J)

MED 236. Psychosocial and Behavioral Health Interventions
For medical students, graduate students and undergraduates with senior standing in Human Biology or Psychology. Contemporary theory and conceptual frameworks for psychosocial and behavioral change interventions as applied in contemporary models of community medicine. The trans-theoretical model of behavioral change, contemporary behavioral, cognitive behavioral, social cognitive and acceptance-based models of behavioral change. Current models of emotion regulation, goal setting and attainment, and the impact of personality and characterological features on behavior and behavioral change. Application of theory in practicum based community clinic settings. Prerequisite: Stanford HIPAA training.
1 unit, not given this year

MED 242. Physicians and Human Rights
Weekly lectures on how human rights violations affect health. Topics include torture, domestic violence, regional conflict and health, sweat shops, rape, and war. Guest speakers.
1 unit, Win (Laws, A)

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, Win (Kiernan, M; Fortmann, S)

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. Recommended: research experience.
1 unit, Aut (Karkazis, K), Win (Karkazis, K), Spr (Staff)

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, Spr (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 a course-affiliated clinic site 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. 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. 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. Prerequisite: 257A,B

1-4 units, Spr (Garcia, G; Banchoff, A)

MED 258. Advanced Patient Advocacy in Community Clinics
Continuation of 257A,B,C for second-year students in Patient Advocacy Program; open to students who have worked in a clinical capacity in a community clinic setting. Skills training in areas such as health education counseling and group facilitation. Regular shifts at partner clinics. Students partner with clinic staff in developing and carrying out a service-learning or research project designed to meet the clinic's needs. May be repeated for credit. Prerequisites: 257A,B,C or consent of instructor.

1-3 units, Aut, Win, Spr , Sum (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. Health literacy and health-seeking behaviors of Oaxacan and other Mexican migrants; examines 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. 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 (Staff)

MED 272A. Biodesign Innovation: Needs Finding and Concept Creation
(Same as BIOE 374A, ME 368A.) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.

2 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. Prerequisite: MED 272A/ME 368A/BIOE 374A.

2 units, Spr (Yock, P; Zenios, S; Milroy, J; Brinton,T)

MED 273A. Biodesign Innovation, Project A
(Same as BIOE 375A, ME 369A.) Interdisciplinary student teams select a medical need, characterize it fully, develop a needs statement, invent potential conceptual approaches to solving the need, and pursue initial prototyping and planning for regulatory and reimbursement pathways. Guest experts. Corequisite: MED 272A/BIOE 374A/ME 368A.

2 units, Win (Yock, P; Zenios, S; Milroy, J; Brinton, T)

MED 273B. Biodesign Innovation, Project B
(Same as BIOE 375B, ME 369B.) Interdisciplinary teams select the most promising invention from MED 273A/ME 369A/BIOE 375A and move into prototyping and project planning. Teams develop strategies for patenting, FDA submission, third-party reimbursement, licensing agreement or launching a start-up, including cash forecasting and business plan. Prerequisites: MED 375A/ME 369A/BIOE 375A. Corequisite: MED 272B/ME 368B/BIOE 374B.

2 units, Spr (Yock, P; Milroy, J; Brinton, T; 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. 3 units requires team project and final presentation. May be repeated for credit.

2-3 units, Win (Gardner, P)

MED 276. Careers in Medical Technology
Career tracks in biomedical technology for medical, life science, engineering, business, and law students. Industry professionals describe career tracks, current roles, and industry perspectives.

1 unit, Spr (Gardner, P; Lee, H)

MED 279Y. Interdisciplinary Design for Agile Aging
(Same as CS 379Y, HUMBIO 131.) Offered by the d.school. Perspectives from computer science, design, social and behavioral sciences, physiology, geriatrics, and biodesign to develop projects that address the potential of people to maintain vitality and mobility as they age. New ways to integrate computer and device technologies with behavioral and social interventions. Focus is on small-group projects based on real-world need finding. Prerequisite: background in one of design, computing, medicine, behavioral sciences, communications, or business.

3-4 units, Win (Winograd, C; Winograd, T; Friedlander, A; Yock, P)

MED 279Z. Design Project for Agile Aging
(Same as CS 379Z.) Second of two quarter sequence; students may take 379Y without 379Z; offered by the d.school. Small teams develop projects that can have an impact in the world through products, programs, and practices that affect people's health on a broad scale. Technical interventions, social and contextual design, organizational contexts, and business and distribution issues. Limited enrollment. Prerequisites: CS379Y, and master's level skills in one of design, computing, medicine, behavioral sciences, communications, or business.

3-4 units, not given this year

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.

1-2 units, Aut (Taylor, C), Win (Taylor, C)

MED 298. Clinical Research in Carbohydrate and Lipid Metabolism
Open to MD, graduate and undergraduate students. Students participate in research protocols associated with disorders of carbohydrate and lipid metabolism. Prerequisite: interview with the course director.

3 units, Aut, Win, Spr , Sum (Reaven, G)

MED 299. Directed Reading in Medicine
Prerequisite: consent of instructor.

1-18 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

See the "School of Medicine" section of this bulletin for more information.

UNDERGRADUATE COURSES IN MEDICINE INTERDISCIPLINARY

INDE 183I. Early Clinical Experience in International Family and Community Medicine
(Same as INDE 283I. Graduate students register for 283I.) For preclinical medical students; undergraduates by special arrangement. Interactive early clinical experience with physicians, community leaders, health care workers, and patients in Mexico, India, China, or Tibet. Emphasis is on community health from local and global perspectives. Social, political, historical, and economic backgrounds of the country and local region. Non-western attitudes, beliefs and practices regarding health care, including herbal and other complementary medicine; local institutions and infrastructure including schools, social services, and the public health care system; and policies that impact health and the provision of care. Prerequisites: conversational Spanish for Mexico; for medical students, completion of first year; for undergraduates, junior standing or higher. Undergraduates apply through International Alliance in Service and Education (IASE) for Mexico; Volunteers in Asia (VIA) for Asian sites. Medical students

6-12 units, Aut (LeBaron, S), Win (LeBaron, S), Spr (LeBaron, S), Sum (LeBaron, S)

INDE 199. Undergraduate Directed Reading and Research in Family and Community Medicine
Interested students should contact the Center for Education in Family and Community Medicine administration. Prerequisite: consent of instructor.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN MEDICINE INTERDISCIPLINARY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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 instruction only register for 1 unit. Students registering for 2 units participate in field activities as well.

1-2 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 instruction only register for 1 unit. Students registering for 2 units participate in field activities as well. Prerequisite: one semester of college-level Chinese or instructor assessment of fluency.

1-2 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. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of Medical Mandarin II, or advanced Chinese proficiency.

1-2 units, Aut (Wang, X; So, S)

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. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of 207C, or advanced Chinese proficiency.

1-2 units, Win (Wang, X; So, S)

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. Students participating in classroom instruction only register for 1 unit. Students registering for 2 units participate in project activities as well. Prerequisite: Completion of 208C or advanced Chinese proficiency.

1-2 units, Spr (Wang, X; So, S)

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 213. Medical Tai Chi
Tai chi as a recognized form of complimentary and alternative medicine. Intended to promote student health and well-being and to decrease stress, depression, and anxiety through the practice of tai chi. Weekly practices under the instruction of world-renowned 20th generation tai chi expert, Master Shu Dong Li. Analysis of the literature regarding health benefits of tai chi.

2 units, Aut (Andrews, J; LeBaron, S), Win (Andrews, J; LeBaron, S), Spr (Andrews, J; LeBaron, S)

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. See http://cwp.stanford.edu.

1 unit, Aut (Shafer, A), Win (Shafer, A), Spr (Shafer, A)

INDE 227. Careers in Medicine: Clinical Medicine and the Biomedical Sciences at the Cutting Edge
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 balance 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 238. Current Concepts and Dilemmas in Genetic Testing
(Same as GENE 238.) Issues arising from the translational process from research to commercialization. Diagnostic inventions and applications, community implications, newborn screening, cancer genetics, and pharmacogenomics. Guest experts. For M.D., biomedical graduate, and genetic counseling students.

2 units, Spr (Tobin, S; Schrijver, I; Cowan, T; Magnus, D)

INDE 244. Ethnicity and Medicine
Weekly lecture series introduces basic information about ethnic and cultural factors that impact patient care. Presents information about culturally sensitive health care services and addresses 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. One unit for weekly lectures only; two units require additional discussions facilitated by course director; three units (non-medical graduate students and undergraduates) require weekly response papers and a research paper.

1-3 units, Spr (Garcia, R)

INDE 245. Women and Health Care
Lecture and seminar series. Topics of interest to women as health care consumers and providers. The historical role of women in health care; current and future changes.

1-2 units, Aut (Grudzen, M; LeBaron, S; Massion, C)

INDE 256. Current Controversies in Women's Health
(Same as OBGYN 256, 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.

3 units, Spr (Jacobson, M; Stefanick, M)

INDE 262A. Providing and Evaluating Health Education for Underserved Children
(Same as HUMBIO 121A.) A service learning experience in community health. Students participate in developing health education materials for underserved middle school students based on principles of human biology and health science ; become knowledgeable about logic modes and other evaluation tools available for evaluating health education modules and community intervnetions; develop an implementation and evaluation plan. Prequisite for undergraduates: Human Biology core or equivalent or consent of instructor.

3 units, Aut (Rodriguez, E; Morioka-Douglas, N)

INDE 262B. Providing and Evaluating Health Education for Underserved Children
(Same as HUMBIO 121B.) Students implement the health education activities/modules developed in INDE 262A/HUMBIO 121A, solicit evaluative feedback, and present the outcomes.

3 units, Win (Rodriguez, E; Morioka-Douglas, N)

INDE 283I. Early Clinical Experience in International Family and Community Medicine
(Same as INDE 183I. Graduate students register for 283I.) For preclinical medical students; undergraduates by special arrangement. Interactive early clinical experience with physicians, community leaders, health care workers, and patients in Mexico, India, China, or Tibet. Emphasis is on community health from local and global perspectives. Social, political, historical, and economic backgrounds of the country and local region. Non-western attitudes, beliefs and practices regarding health care, including herbal and other complementary medicine; local institutions and infrastructure including schools, social services, and the public health care system; and policies that impact health and the provision of care. Prerequisites: conversational Spanish for Mexico; for medical students, completion of first year; for undergraduates, junior standing or higher. Undergraduates apply through International Alliance in Service and Education (IASE) for Mexico; Volunteers in Asia (VIA) for Asian sites. Medical students

6-12 units, Aut (LeBaron, S), Win (LeBaron, S), Spr (LeBaron, S), Sum (LeBaron, S)

MEDIEVAL STUDIES (MEDVLST) COURSES

For information on undergraduate programs in Medieval Studies, see the "Medieval Studies" section of this bulletin.

UNDERGRADUATE COURSES IN MEDIEVAL STUDIES

MEDVLST 165. Crusades: Interdisciplinary Approaches
(Same as ENGLISH 103, HISTORY 215, RELIGST 140.) Causes, meanings, meaningfulness, and commemoration of the Christian expeditions against Muslims, pagans, and heretics. Primary and secondary sources. GER:DB-Hum

3-5 units, given next year

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

For information on graduate programs in Microbiology and Immunology, see the "Microbiology and Immunology" section of this bulletin.

UNDERGRADUATE COURSES IN MICROBIOLOGY AND IMMUNOLOGY

MI 25N. Modern Plagues
Preference to freshmen. Molecular and medical aspects of new and old microorganisms that infect humans. Goal is to place modern human plagues in scientific and historical perspective. Focus is on factors that lead to emergence and control.

3 units, not given this year

MI 104. Innate Immunology
(Same as MI 204. Undergraduates register for 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 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, Aut (Siegel, R)

MI 155H. Humans and Viruses I
(Same as HUMBIO 155H.) 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: 155H.

6 units, not given this year

MI 185. Topics in Microbiology
For advanced undergraduates. Topics include diversity, molecular regulation, growth, bioenergetics, and unique matabolic processes. Presentation of student papers on current topic selected with student input; last year's topic was cancer chemotherapy. 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 MI 104. Undergraduates register for 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, Win (Sarnow, P)

MI 210. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites: Part II
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, Spr (Chen, C)

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.) Required of first-year graduate students in Microbiology and Immunology, and the Immunology program. 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, organic chemistry, and physics.

3 units, Spr (Kirkegaard, K)

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, 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, D)

MI 299. Directed Reading in Microbiology and Immunology
Prerequisite: consent of instructor.

1-18 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)

MODERN THOUGHT AND LITERATURE (MTL) COURSES

Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Slavic Languages and Literatures, Portuguese, and Spanish. For information on undergraduate and graduate programs in Modern Thought and Literature, see the "Modern Thought and Literature" section of this bulletin.

GRADUATE COURSES IN MODERN THOUGHT AND LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor. Students in the doctoral program in Modern Thought and Literature are advised to read through the offerings in English as well as offerings of the non-literature departments in which they wish to concentrate: for example, courses dealing with culture listed under Anthropology, courses dealing with film under Communication or Art and Art History, courses in intellectual and cultural history under History. If the area of nonliterary interest is thematic rather than disciplinary, doctoral students should look under program listings such as Feminist Studies, African and African American Studies, or Comparative Studies in Race and Ethnicity.

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.
2 units, Win (Heise, U)

MTL 300. Modern Thought and Literature Colloquium
Required of first-year graduate students in the program; open to all students in the program and to others by consent of instructor. Weekly meeting of students in the program to discuss interdisciplinary scholarship, writing, and issues pertaining to the requirements for the Ph.D. Presentations by affiliated faculty and by student panels. (Mudimbe-Boyi)
1-3 units, Spr (Simpson, R)

MTL 334A. The Modern Tradition I
(Same as LAW 501.) The development over the modern period of ideas about state regulatory power and legal rationality; recent critiques of those ideas. Focus is on justice, legal interpretation, individual agency and moral choice, equality, punishment, legislation, the nation state, and international society. Readings from Sophocles, Grotius, Kant, Rousseau, Hegel, Montesquieu, Wollstonecraft, Austin, Bentham, Marx, Weber, Arendt, Foucault, Said, Spivak, Butler, Habermas, MacKinnon, Rose, and Kennedy.
5 units, not given this year

MTL 334B. The Modern Traditions II: The Study of Culture in the Age of Globalization
(Same as ENGLISH 334B.) 20th-century theory with focus on the concept of culture and methods of studying it from diverse disciplines including sociology, anthrolopogy, history, literary and cultural studies. Modernization, postmodernization, and globalization in their relations to culture broadly understood, cultures in their regional, national, and diasporic manifestations, and cultures as internally differentiated such as high and low culture, subcultures, and media cultures. Readings include Gramsci, Adorno, Horkheimer, Williams, Hall, Gilroy, Hebdige, Jameson, García Canclini, Foucault, Bourdieu, Geertz, Clifford, Saïd, Appadurai, and Appiah.
5 units, Aut (Heise, U)

MTL 390. Qualifying Paper
Preparation and writing of the qualifying paper for the Ph.D. in Modern Thought and Literature.
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)

MOLECULAR AND CELLULAR PHYSIOLOGY (MCP) COURSES

For information on graduate programs in Molecular and Cellular Physiology, see the "Molecular and Cellular Physiology" section of this bulletin. Course and laboratory instruction in the Department of Molecular and Cellular Physiology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN MOLECULAR AND CELLULAR PHYSIOLOGY

MCP 100Q. The Hippocampus as a Window to the Mind
Stanford Introductory Seminar. Preference to sophomores. Electrical physiology of the brain using the hippocampus as a model system. The seminar builds from basic anatomical and electrical principles of brain structure and function, through the electrical properties of individual neurons and simple neuronal circuits, to the nature of behaviors that emerge from these more basic properties. Also discusses other brain regions where the hippocampal model provides insight into specific neuronal functions. Culminates in a discussion of neuronal disorders such as epilepsy, drug addiction, and obsessive-compulsive disorder that can be better understood on a basis of knowledge of the hippocampal model.
3 units, Win (Madison, V)

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 (Kobilka, B)

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.
3 units, Spr (Garcia, K)

MCP 213. Special Topics in Molecular and Cellular Physiology
Introductory and advanced physiological topics agreed on by an instructor and students. Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

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, Spr (Goodman, M)

MCP 222. Imaging: Biological Light Microscopy
(Same as BIO 152, NBIO 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.
3 units, alternate years, not given this year

MCP 232. Advanced Imaging Lab in Biophysics
(Same as 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; Schnitzer, M; 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, Spr (Maduke, M; Lewis, R)

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.

5 units, alternate years, 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 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.

1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

MUSIC (MUSIC) COURSES

Many Music courses have web pages linked to the Music home page. Courses with web sites at press time are noted in their entries below. For information on undergraduate and graduate programs in the Department of Music, see the "Music" section of this bulletin.

UNDERGRADUATE COURSES IN MUSIC

Students with training in theory should take the placement exam given at the beginning of each quarter for admission to more advanced courses. Students must not assume that they may begin study with MUSIC 21.

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 6A. Musical Treasures of Asia

Introduction to the music of Asian cultures emphasizing China, India, Indonesia, Japan, and Korea. Ethnic, social, cultural, and global perspectives. Instruments and ensembles in performance contexts such as sacred rituals and secular dance and theater. Traditional genres and their impact on contemporary composers. No musical background required. GER:DB-Hum, EC-GlobalCom

3 units, Win (Kapuscinski, J)

MUSIC 7A. World Music and Globalized Culture

The circulation of musicians, audiences, instruments and other musical technologies, songs, recordings, and musical genres. What happens when music moves from rural to urban contexts, across national boundaries, into new mediascapes and technological regimes? Emphasis is on recent developments. Topics include: Arabic, Chinese, and Hindustani classical music; hip hop's global reach; carnival in the Americas; Bollywood film; music, Islam, and the state; attempts at creating pan-Asian pop; the spread of the guitar and the brass band; ringtones and mobile music; YouTube.

3 units, Aut (Kronengold, C)

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, Spr (Applebaum, M), alternate years, not given next year

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 14N. Women Making Music

Stanford Introductory Seminar. Preference to freshmen. Women's musical activities across times and cultures; how ideas about gender influence the creation, performance, and perception of music. GER:DB-Hum, EC-Gender

3 units, Aut (Hadlock, H)

MUSIC 16N. Music, Myth, and Modernity: Wagner's Ring Cycle and Tolkien's Lord of the Rings

(Same as GERLIT 16N.) Stanford Introductory Seminar. Preference to freshmen. Roots of Wagner's operatic cycle and Tolkien's epic trilogy in a common core of Norse, Germanic, and Anglo-Saxon mythology. The role of musical motive and characterization in Wagner's music dramas and the film version of Tolkien's trilogy. Music as a key element in the psychological, political, and cultural revision of ancient myth in modern opera and film. GER:DB-Hum, EC-GlobalCom

3 units, Spr (Grey, T)

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), alternate years, not given next year

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. Concurrent enrollment in MUSIC 12 (Piano) or demonstration of keyboard skills sufficient to pass the Piano Proficiency Exam within the first two weeks of the term is required. Enrollment limited to 40. Prerequisite: pass a basic musical skills proficiency examination on first day of class; students who do not pass may take 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: 21 or consent of instructor; demonstration of keyboard skills sufficient to pass the Piano Proficiency Exam within the first two weeks of the term is required, or concurrent enrollment in MUSIC 12. 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: 22 or consent of instructor; demonstration of keyboard skills sufficient to pass the Piano Proficiency Exam within the first two weeks of the term is required, or concurrent enrollment in MUSIC 12. GER:DB-Hum
4 units, Aut (Berger, T), Spr (Ulman, E)

MUSIC 37N. *Ki ho'alu:* The New Renaissance of a Hawaiian Musical Tradition
Stanford Introductory Seminar. Preference to freshman. Developed in the Hawaiian Islands during the 1830s, *ki ho'alu*, or Hawaiian slack key guitar, is an art form experiencing newfound popularity coinciding with the growth of political activism in Hawaiian culture. The musical, cultural, historical, and political perspectives of Hawaiian music and *ki ho'alu*, through hands-on experience, readings, discussion, and workshops. Hawaiian music and history and relationships among performance, cultural expression, community, and identity. GER:DB-Hum, EC-AmerCul
3 units, Aut (Sano, S)

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, Spr (Rodin, J)

MUSIC 40. Music History to 1600
Pre- or corequisite: 23. GER:DB-Hum
4 units, Aut (Rodin, J)

MUSIC 41. Music History 1600-1830
Pre- or corequisite: 23. GER:DB-Hum
4 units, Win (Hadlock, H)

MUSIC 42. Music History Since 1830
Pre- or corequisite: 23. GER:DB-Hum
4 units, Spr (Grey, T)

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 (Linduska, M), 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 (Linduska, M), 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 (Linduska, M), 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 (Ulman, E)

MUSIC 122A. Eighteenth-Century Counterpoint
Analysis and composition of two- and three-part inventions and three- and four-voice fugues. Use of keyboard, ear training, and sight singing. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations. GER:DB-Hum
4 units, Spr (Rodin, J)

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, Win (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, Aut (Ulman, E)

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)

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, Aut (Aquilanti, G)

MUSIC 128. Composition, Coding, and Performance with SLOrk
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 128X. Composing, Coding, and Performance for Laptop Orchestra (Extended)
Composing, coding, and performing with the medium of the laptop orchestra. Prerequisite: MUSIC 128 and consent of instructor.
1 unit, Aut (Wang, G), Win (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 (Morgan, R), alternate years, not given next year

MUSIC 130B. Elementary Orchestral Conducting
Prerequisites: 127 or previous orchestral performance experience, 130A.
3 units, Spr (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, Win (Wait, G), alternate years, not given next year

MUSIC 140. Studies in Medieval Music
(Same as MUSIC 240.) May be repeated for credit. Pre- or corequisite: 23 GER:DB-Hum
3-4 units, alternate years, not given this year

MUSIC 141. Studies in Renaissance Music
(Same as MUSIC 241.) May be repeated for credit. Pre- or corequisite: 23. GER:DB-Hum
3-4 units, not given this year

MUSIC 142. Studies in Baroque Music
(Same as MUSIC 242.) May be repeated for credit. Pre- or corequisite: 23. GER:DB-Hum
3-4 units, not given this year

MUSIC 143. Studies in Classic Music
(Same as MUSIC 243.) May be repeated for credit. Pre- or corequisite: 23. GER:DB-Hum
3-4 units, Spr (Hadlock, H)

MUSIC 144. Studies in Romantic Music
(Same as MUSIC 244.) May be repeated for credit. Pre or corequisite: 23. GER:DB-Hum
3-4 units, not given this year

MUSIC 145. Studies in Modern Music
(Same as MUSIC 245.) May be repeated for credit. Pre- or corequisite: 23. GER:DB-Hum
3-4 units, not given this year

MUSIC 148. Musical Shakespeare: Theater, Song, Opera, and Film
(Same as HUMNTIES 192G, 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*. May be repeated for credit. Pre- or corequisite: 23.
4-5 units, Win (Grey, T)

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- or corequisite: 23 or consent of instructor. GER:DB-Hum
3-4 units, Aut (Barth, G; Arul, K)

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, Win (Rossing, T)

MUSIC 151. Psychophysics and Cognitive Psychology for Musicians
Concepts and experiments relevant to the use of sound, especially synthesized, in music. Listening to sound examples. Emphasis is on salience and the importance of various auditory phenomena in music. See http://ccrma.stanford.edu/. Prerequisite: basic knowledge of music. GER:DB-Hum, WIM
4 units, Win (Berger, J; Menon, V)

MUSIC 152. Anthropology of Sound, Identity, and Place
(Same as ANTHRO 127A.) The ethnography of sound; challenges and opportunities in representing and interpreting the music, noise, and silence of human cultures. Readings include work that avoids, engages with, distorts, and celebrates sound. Goal is for the students to develop critical theories and techniques. Guest lecturer is MacArthur Fellow Steven Feld. Fieldwork includes making recordings; final project.
5 units, Win (Diehl, K)

MUSIC 154. Composition and Performance of Instrumental Music with Electronics
Aesthetic and analytical issues of mixed instrumental and electronic works. Focus is 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 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, Aut (Applebaum, M)

MUSIC 157. Introduction to Mariachi Ensemble
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 (Staff), Win (Staff), Spr (Staff)

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, Win (DiPietro, R)

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 (Cai, J), 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 (Cai, J), Win (Cai, J), Spr (Cai, J)

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 4 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.
2 units, Aut (Wait, G), Win (Wait, G), Spr (Wait, G)

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 169A. Seminar in Performance Practices
(Same as MUSIC 269A.) Performance techniques, theoretical principles, aesthetics, and musical resources of various historical periods. GER:DB-Hum
1-4 units, alternate years, not given this year

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 coachings (1 hr) from Music Dept. Faculty. Classical string quartets and piano/ string groups are supervised by the St. Lawrence String Quartet, and require attendance at a weekly Wednesday 4:15pm masterclass. 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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

MUSIC 174C. Violoncello
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

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. Early Plucked Strings
(Same as MUSIC 274I.)
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 175A. Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 181. Advanced Voice Performance
Performance class in a workshop setting. Skills including style, diction, interpretation, and expression in art song, oratorio, and opera literature. Repertoire varies and spans more than one quarter. May be repeated for credit a total of 14 times. Prerequisite: private-lesson proficiency in voice or consent of instructor.
1 unit, Aut (Wait, G), Win (Schneider, A), Spr (Schneider, A)

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, alternate years, 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), alternate years, not given next year

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: 151; 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.
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)

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.
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 (Wang, G)

MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Spatial Processing

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. Majors (undergraduate or graduate) must take for 4 units. 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. Majors (undergraduate or graduate) must take for 4 units. See http://ccrma.stanford.edu. May be repeated for credit. Prerequisite: 220B.

2-4 units, Spr (Caceres, J)

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, alternate years, 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 (Cai, J), 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.) May be repeated for credit. Pre- or corequisite: 23

3-4 units, alternate years, not given this year

MUSIC 241. Studies in Renaissance Music

(Same as MUSIC 141.) May be repeated for credit. Pre- or corequisite: 23.

3-4 units, not given this year

MUSIC 242. Studies in Baroque Music

(Same as MUSIC 142.) May be repeated for credit. Pre- or corequisite: 23.

3-4 units, not given this year

MUSIC 243. Studies in Classic Music

(Same as MUSIC 143.) May be repeated for credit. Pre- or corequisite: 23.

3-4 units, Spr (Hadlock, H)

MUSIC 244. Studies in Romantic Music

(Same as MUSIC 144.) May be repeated for credit. Pre- or corequisite: 23.

3-4 units, not given this year

MUSIC 245. Studies in Modern Music

(Same as MUSIC 145.) May be repeated for credit. Pre- or corequisite: 23.

3-4 units, not given this year

MUSIC 248. Musical Shakespeare: Theater, Song, Opera, and Film

(Same as HUMNTIES 192G, 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*. May be repeated for credit. Pre- or corequisite: 23.

4-5 units, Win (Grey, T)

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- or corequisite: 23 or consent of instructor.

3-4 units, Aut (Barth, G; Arul, K)

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)

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 (Ju, W)

MUSIC 251. Music, the Brain, and Human Behavior

The perception, cognition, and neuroscience of music. Prerequisite: MUSIC 151 or consent of instructors.

1-5 units, Win (Berger, J; Menon, V)

MUSIC 253. Musical Information: An Introduction

The kinds of musical information used in sound, graphical, and analytical applications. Emphasis is on independent concepts and principles in music representation and research objectives (repertory analysis, performance analysis, theoretical models, similarity, and stylistic simulation). Examples from Western art music. Prerequisites: one year of music theory or equivalent; methods courses in fields such as musical analysis, symbolic systems, information processing, sound engineering, or intellectual property issues.

1-4 units, Win (Selfridge-Field, E)

MUSIC 254. Applications of Musical Information: Query, Analysis, and Style Simulation

Participants explore the issues introduced in 253 in greater depth and take initiative for research projects related to a theoretical or methodological issue, a software project, or a significant analytical result. Prerequisite: 253 or consent of instructor.

1-4 units, Spr (Selfridge-Field, E)

MUSIC 256. Music, Computing, and Design

Topics include interactive software system design for computer music, implementation strategies and best practices, software interface design and visualization, and real-time audio systems. Open-source, software re-use, and the intersection of audio and graphics. Crafting software systems for computer music and multimedia. Programming projects in C++ and the ChucK programming language. Prerequisite: a programming course in C++/Java or equivalent experience. May be repeated once for credit.

1-4 units, Aut (Wang, G)

MUSIC 269A. Seminar in Performance Practices

(Same as MUSIC 169A.) Performance techniques, theoretical principles, aesthetics, and musical resources of historical periods.

1-4 units, alternate years, not given this year

MUSIC 269B. Research in Performance Practices

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 (Staff), Win (Staff), Spr (Staff)

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, Win, 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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

MUSIC 274C. Advanced Violoncello
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

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. Early Plucked Strings
(Same as MUSIC 174I.)
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

MUSIC 275A. Advanced Flute
May be repeated for credit a total of 14 times.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Staff), Win (Staff), Spr (Staff)

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 (Ruviaro, B; Heel, K)

MUSIC 300A. Medieval Notation
Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.
4 units, alternate years, not given this year

MUSIC 300B. Renaissance Notation
Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.
4 units, Aut (Mahrt, W), alternate years, not given next 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 (Ulman, E)

MUSIC 302. Research in Musicology
May be repeated for credit a total of 7 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 (Rodin, J), Spr (Mahrt, W)

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), alternate years, not given next year

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), alternate years, not given next year

MUSIC 318. Advanced Acoustics
Current topics. May be repeated for credit.
1-5 units, Win (Rossing, T)

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
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. Students present their own work to the class, and individually to the instructor. May be repeated for credit a total of 14 times.

4 units, Aut (Applebaum, M), 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 420. 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 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), Win (Smith, J), Spr (Smith, J)

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

For information on undergraduate programs in Native American Studies, see the "Comparative Studies in Race and Ethnicity" section of this bulletin.

UNDERGRADUATE COURSES IN NATIVE AMERICAN STUDIES

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 109B. Indian Country Economic Development
(Same as CSRE 109B.) The history of competing tribal and Western economic models, and the legal, political, social, and cultural implications for tribal economic development. Case studies include mineral resource extraction, gaming, and cultural tourism. 21st-century strategies for sustainable economic development and protection of political and cultural sovereignty.

5 units, not given this year

NATIVEAM 117S. History of California Indians
(Same as CSRE 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)

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

For information on graduate programs in Neurobiology, see the "Neurobiology" section of this bulletin. Course and laboratory instruction in the Department of Neurobiology, conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html. The department offers a one quarter course (NBIO 206) on the structure and function of the nervous system, which is open to medical and graduate students and advanced undergraduates. Advanced courses are open to students who have completed this basic course.

UNDERGRADUATE COURSES IN NEUROBIOLOGY

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.

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, 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, Spr (Goodman, M)

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: 206 or consent of instructor.

4 units, alternate years, not given this 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 (Newsome, W; Moore, T), alternate years, not given next year

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)

NBIO 222. Imaging: Biological Light Microscopy
(Same as BIO 152, 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.

3 units, alternate years, not given this year

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 (Carter, M; Villeda, S; Clark, K)

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, Spr (Corrado, G)

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. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors.

4-5 units, Aut (Luo, L; Shen, K; Clandinin, T), 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.

5 units, alternate years, 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 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

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 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.
3 units, Win (Rando, T; Carstensen, L)

NENS 205. Neurobiology of Disease Seminar
Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic principles underlying modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity. Prerequisite: Neurobiology 206 or consent of instructor.
2 units, Win (Yang, Y; Mobley, W; Reimer, R), alternate years, not given next year

NENS 206. Introduction to Neurology Seminar
Exploration of aspects of neurology, including subspecialties. Current issues, clinical cases, and opportunities in the field.
1 unit, Spr (Barreto-Chang, O; Reimer, R)

NENS 220. Computational Neuroscience
Computational approaches to neuroscience applied at levels ranging from neurons to networks. How do neurons compute? 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. Final project. Prerequisite: NBIO 206; undergraduates require consent of instructor.. Recommended: facility with linear algebra and calculus recommended.
4 units, not given this year

NENS 221. Current Issues in Aging
(Same as DBIO 221, 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; Rando, T)

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, 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 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)

NEUROSCIENCES PROGRAM (NEPR) COURSES

For information on graduate programs in the Neurosciences Program, see the "Neurosciences" section of this bulletin. Course and laboratory instruction in the Neurosciences Program conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

GRADUATE COURSES IN NEUROSCIENCES PROGRAM

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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)

NEUROSURGERY (NSUR) COURSES

For information on graduate programs in Neurosurgery, see the "Neurosurgery" section of this bulletin.

UNDERGRADUATE COURSES IN NEUROSURGERY

NSUR 70Q. Experimental Stroke
(F,Dial) 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, Win (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, Aut (Deisseroth, K; Palmer, T)

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, Win, 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), alternate years, not given next year

NSUR 299. Directed Reading in Neurosurgery
Prerequisite: consent of instructor.
1-18 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

OBSTETRICS AND GYNECOLOGY (OBGYN) COURSES

For information on graduate programs in Obstetrics and Gynecology, see the "Obstetrics and Gynecology" section of this bulletin.

UNDERGRADUATE COURSES IN OBSTETRICS AND GYNECOLOGY

OBGYN 78Q. Darwin's Evolution and Genomic Revolution
Preference to sophomores. Topics include evolution based on fossil and genetic evidence, mechanisms of natural selection, the impact of genomic revolution on the study of gene evolution, new gene discovery, human-accelerated selection, Darwinian medicine, and the social implications of evolution.
3 units, not given this year

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.) 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; Behr, B)

OBGYN 256. Current Controversies in Women's Health
(Same as HUMBIO 125, INDE 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.
3 units, Spr (Jacobson, M; Stefanick, M)

OBGYN 399. Graduate Research - 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)

ORTHOPEDIC SURGERY (ORTHO) COURSES

UNDERGRADUATE COURSES IN ORTHOPEDIC SURGERY

ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine
(S,Sem Same as HUMBIO 97Q.) Stanford Introductory Seminar. 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), Spr (Matheson, G)

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 222. Anatomy of Movement
Perspectives include orthopedic surgery, neurology, mechanical engineering, computer science, anthropology, and art. Anatomy and pathology affecting the human locomotor system. Normal function and functional deficit from disease or injury. Engineering dilemmas that assist or emulate human movement, such as design of an artificial joint or simulation of tendon transfers for nerve palsy. The expression of human movement in art masterpieces and photography. The evolution of the hand as it became an instrument of purpose. Student team projects. Lecture only for 2 units; project for 4 units.
2-4 units, Win (Ladd, A; Rose, J)

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, Win (Smith, R)

OVERSEAS STUDIES SPECIAL PROGRAMS (OSPGEN) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS SEMINARS

These three-week, faculty-led seminars are offered prior to the beginning of Autumn Quarter. Locations are announced in December and applications are taken in January for the following academic year.

OSPGEN 80. Changing Face of the World: Cultural, Scientific, Medical and Social Aspects of Craniofacial Biology
Field trips to London's Darwin Center to examine his work on the evolution of facial architecture, and Guy's Hospital and museum. Students work with Changing Faces, a charity seeking to change views of disfigurement. Field trips to Paris' cranialfacial biologist Nicole Le Douarin and her institute, and to museums to examine artists' views of the face. Facial transplants and ethical considerations.
2 units, Aut (Helms, J)

OSPGEN 81. Shakespeare and Friends: Adventures in England's Theater Scene
Immersion in England's theater scene. Students attend shows in London and Stratford. Under the guidance of Nona Shepphard of the Royal Academy of Dramatic Arts, students produce a short excerpt from a Shakespeare play for performance at the end of the seminar.
2 units, Aut (Friedlander, L)

OSPGEN 82. Education, Health Care, and Development in Emerging China
Current status of education and health care systems in China. Contrast education and health care systems prior to recent reforms with those of today. Major problems and ongoing solutions put forth by the central government. Field trips to rural and urban educational and health institutions; local guest speakers; interaction with students at Renmin University in Beijing. Students work in groups to propose reforms of China's education and health care delivery systems.
2 units, Aut (Rozelle, S; Atlas, S)

OSPGEN 83. Gandhi and His Legacy: Nonviolence in India, the U.S., and the World
Gandhi's life, thought, and legacy in settings where he lived and struggled, including the sites of his assassination and cremation, Sevagram Ashram, Gandhi's home base for twelve years, and Kolkata, site of one of his fasts. Connections between Gandhi and Martin Luther King. Guest speakers include academics and social activists, and may include his grandson, Gopalkrishna Gandhi.
2 units, Aut (Carson, C; Hess, L)

OSPGEN 84. Natural History and Behavioral and Evolutionary Ecology
Natural history, biodiversity, and ecology of a species-rich tropical dry forest in Western Mexico. Focus on plant/insect interactions, as representing the architecture of biodiversity.Questions in ecology, evolution, behavior, and conservation biology, in this ecosystem. Students work at the Chamela Tropical Research Station, a fully-equipped field research facility administered by the National University of Mexico (UNAM). Hands-on research experience and methods of scientific research.
2 units, Aut (Gordon, D; Dirzo, R)

OSPGEN 85. Project Finance, Urban Development, and Construction in the Middle East
Conditions and processes for the sustainable development of Doha and Qatar. Topics include: history and economy; existing and planned infrastructure, and its sustainable development and operation; ongoing commercial and institutional developments; 4D modeling; scoping, phasing, and analysis of development projects; regional competitiveness analysis; development risk identification and assessment; assessment of social, political, and financial sustainability. Small groups develop a proposal, plan, and presentation for the development of a large-scale project.
2 units, Aut (Fischer, M; Orr, R)

OSPGEN 86. St. Petersburg and Beyond
Unique role of St. Petersburg in Russian cultural history. History, architecture, art, city planning, literature, music, ballet, and politics. Prerequisite: ARTHIST 107A.
2 units, Aut (Kollmann, N; Kollmann, J)

OSPGEN 87. Thailand: Education, Development, and Globalization
Instructors team with the faculties of Education, Engineering, and Science at Chulalongkorn University in Bangkok. Visits to other educational institutions, offices of international organizations, and historical sites in Bangkok, and schools and rural villages outside of the capital.
2 units, Aut (Antonio, A; Wotipka, C)

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)

OSPGEN 89. Tibetan Buddhism in Bhutan and Gross National Happiness
Function of Buddhism in the social, political, and economic development of the Kingdom of Bhutan; the national development theory, Gross National Happiness, and its roots in Buddhism.
2 units, Aut (Mancall, M; Watkins, G)

OVERSEAS STUDIES: AUSTRALIA (OSPAUSTL) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN AUSTRALIA

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 Biology major. GER:DB-EngrAppSci
3 units, Aut (Hoegh-Guldberg, O; Ward, S; Arrigo, K)

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 Biology 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 Biology major. GER:DB-EngrAppSci

3 units, Aut (Hall, J)

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: BEIJING (OSPBEIJ) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN BEIJING

OSPBEIJ 3C. First-Year Modern Chinese

5 units, Spr (Staff)

OSPBEIJ 9. Chinese Language Tutorial

2 units, Aut (Staff), Spr (Staff)

OSPBEIJ 11. Chinese Society in the Post-Mao Era

The rapid changes that have transformed urban and rural China since the early 80s. Topics: agricultural reform, migration and unemployment, poverty and wealth, inequality, the new middle class and business elite, and social conflict. Research paper on one of these topics. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Walder, A)

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 (Staff)

OSPBEIJ 23C. Second-Year Modern Chinese

5 units, Spr (Staff)

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, Spr (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, Spr (Rozelle, S)

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 43. Constitutional and Legal Reforms in Contemporary China

Key issues of legal reform toward civil society and the rule of law in China. Basic framework of China's society, political structure, individual rights, and regulatory process. Case studies. Comparison to corresponding systems in U.S. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Wang, X)

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, Aut (Chen, D)

OSPBEIJ 47. Institutional Change in Reform China

Process and content of institutional change and its consequences in China since 1978. Key variables that explain the course of China's reforms. Isues: key political actors; role of the central state and its agents; incentives motivating responses to reforms; winners and losers in the different reforms; new problems emerging as a consequence of piecemeal reform. Recommended: basic knowledge of government and politics of post-1949 China. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Oi, J)

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 101C. Third-Year Modern Chinese

5 units, Aut (Staff)

OSPBEIJ 103C. Third-Year Modern Chinese

5 units, Spr (Staff)

OSPBEIJ 211C. Fourth-Year Modern Chinese

5 units, Aut (Staff)

OVERSEAS STUDIES: BERLIN (OSPBER) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN BERLIN

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 (Splettstoesser, J; Wohlfeil, J), Win (Splettstoesser, J; 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 12. The Politics of Memory
Politics of memorializing WW II focusing on Berlin. How the memory of WW II and its representation became constitutive to the self-consciousness of democratic culture in Germany. What constitutes the nature of collective memory; who has the authority to represent the war; the function of the memorial in public consciousness; and limits of representation of terror or genocide. Theoretical literature on politics of memory. Field trips to memorials. GER:DB-SocSci, EC-GlobalCom
3 units, Win (Fonrobert, C)

OSPBER 13. Jewish and Muslim Berlin: The City and its Religious Minorities
History of Jewish life in Berlin leading up to WW II, focusing on moments of literary and cultural creativity: the Jewish Enlightenment in Berlin; forms of protest against bourgeois German-Jewish culture; and literary, artistic, and political productivity of the interwar period. Cultural relationship between Germans and Jews. These historical dynamics as background to current discussion about the place of Islam and Muslim culture in contemporary Germany and Berlin. Site visits in Berlin. GER:DB-SocSci, EC-GlobalCom
3 units, Win (Fonrobert, C)

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 (Friesel, D), Win (Friesel, D), Spr (Friesel, D)

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 (Ebeling, K), Win (Ebeling, K), Spr (Ebeling, K)

OSPBER 38. Research Module
For continuing students. Research under the guidance of a local specialist in libraries, archives, research institutes, and/or in the field. Prerequisite: GERGEN 177A. (Kramer)
3-4 units, Win (Staff), Spr (Staff)

OSPBER 40B. Introductory Electronics
GER:DB-EngrAppSci
5 units, Aut (Howe, R), Win (Howe, R), Spr (Wong, S)

OSPBER 47. Ethics in Medicine and Everyday Life
Ethical conflicts in relation to life situations. Moral questions in the conduct of science. Collaboration of physicians and academics with Nazi medical experiments; Milgram's experiments on obedience; Stanford's prison experiments; misleading marketing strategies used by the tobacco industry; ethics of placebo controlled clinical trials; decisions related to stem cell research and reproductive technologies. GER:EC-EthicReas
4 units, Aut (Casper, R)

OSPBER 48. Topics in Medicine and Ethics
Independent study with weekly meetings. Topics: comparative analysis of legislation of human fertilization and embryology in the U.S. and UK; history and structure of the health care systems in Germany, Canada, and the U.S.; lives of admirable precepts but dubious practice such as Seneca, the Stoics, and Rousseau; promise and pitfalls of genetically modified plant and animal food. Do ethnic, national, and professional stereotypes serve a function? Primarily in English, but some topics might require German.
2-4 units, Aut (Casper, R)

OSPBER 50B. Introductory Science of Materials
GER:DB-EngrAppSci
4 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPBER 52. European Modernism in Art
French and German modernist artists such as Cezanne, Van Gogh, Kirchner, and Kandinsky in the period of early modernist art. Cubism, Dadaism, Surrealism, and the German period Neue Sachlichkeit. Why modernism took certain directions in these countries, how the social and political circumstances in these areas impacted the arts, and how artists acted and reacted in these sociopolitical environments. GER:DB-Hum
4 units, Spr (Barton, B)

OSPBER 53. The Brothers Grimm and their Fairy Tales
Cultural context for collection of these fairy tales. Questions related to sources of the tales; reception of tales in different cultures and at different times; values represented by the tales; service to interests of German states in the present and past. Theoretical perspectives such as feminist and psychoanalytic. In German. GER:DB-Hum
4 units, Spr (Robinson, O)

OSPBER 55. Filmed Experience: Berlin at Eye-Level
Screenings of films made in Berlin to develop awareness of the practical side of filmmaking: narration; camera angles; editing. Writing exercises (reviews, analysis of storyline, characters). Individual student projects: writing of film treatment or production of short video. GER:DB-Hum
5 units, Spr (Maerker, C)

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
4-5 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, Spr (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 70. The Long Way to the West: German History from the 18th Century to the Present
Battles still current within Germany's collective memory. Sources include the narrative resources of museums, and experts on the German history in Berlin and Potsdam. Field trips. GER:DB-Hum, EC-GlobalCom

5 units, Spr (Jander, M)

OSPBER 100B. Aktives Deutsch
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 (Friesel, D), Win (Friesel, D), Spr (Strube, F)

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. GER:DB-Hum

5 units, 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, 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, Aut (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, 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 177A. Culture and Politics in Modern Germany
Key paradigms of modern Germany: German romanticism, the belated state and national identity, National Socialism and the Holocaust, Germany divided and unified. Literary, analytical, and theoretical texts; newspaper articles; film and TV; oral history. GER:DB-SocSci, EC-Gender

4-5 units, Aut (Kramer, K)

OVERSEAS STUDIES: FLORENCE (OSPFLOR) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN FLORENCE

OSPFLOR 18. Centro Linguistico
Opportunities to improve Italian language skills through activities at the Centro Linguistico including workshops, guided discussions, and meetings with Italian students. May be repeated for credit. (AU)

1 unit, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 21F. Second-Year Italian, First Quarter
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.

4 units, Aut (Quercioli, F), Win (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 22F. Second-Year Italian, Second Quarter
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.

4 units, Win (Quercioli, F)

OSPFLOR 31F. Advanced Italian Conversation
Refine language skills and develop insight into Italian culture using authentic materials. Group work and individual meetings with instructor.

4 units, Aut (Quercioli, F), Spr (Quercioli, F)

OSPFLOR 32. Service Learning in Italian
Oral and linguistic skills and increased cultural awareness through service to a local social work organization. Issues of contemporary Italian social change. Organizations include Caritas diocesana, Communita de S. Egidio, and Progetto Arcobaleno.

4 units, Win (Quercioli, F)

OSPFLOR 33. The Americanization of Italy
How cultural and social patterns from the U.S. shape everyday life in contemporary Italy. Popular culture and consumer culture as vehicles of penetration; role of supermarkets, malls, and new patterns of consumption. Are American models accepted or changed according to Italian culture? How global and local interact in this cultural encounter. GER:DB-SocSci

4 units, Spr (Scarpellini, E)

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 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, Win (Campani, E), Spr (Campani, E)

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 46. International Monetary Economics
Balance of payments and exchange rates from theoretical and institutional point of views; relationships that operate in international exchange rate and financial markets, including interaction in standard models linking exchange rates with fundamental macroeconomic variables; and consequences of capital liberalization process of last twenty years, including institutional innovations such as the EMU and the Euro and empirical challenges of recent financial upheavals in Asia and Latin America. GER:DB-SocSci, EC-GlobalCom
5 units, Spr (Cifarelli, G)

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), Win (Staff), Spr (Staff)

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), Win (Staff), Spr (Staff)

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 1059-2008
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 60. North/South in Contemporary Italy
Italian unification between north and south: economic, social, cultural, and linguistic. History of conflict between north and south from the Risorgimento to the present, with a focus on prose fiction and film. GER:DB-Hum
4 units, Win (Springer, C)

OSPFLOR 61. Europe and U.S. Foreign Policy
Relationship between Europe and U.S. foreign policy, with an emphasis on developments since 1990. Sources of conflict and cooperation in this relationship. Topics include: U.S.-European defense cooperation; role of Europe in American decisions to use force; European responses to U.S. power, especially since 9/11 and the Iraq war; sources and consequences of anti-Americanism in European publics; and the effects of U.S. foreign policy on European integration. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Schultz, K)

OSPFLOR 62. Resistance: 1943-45
Texts from the immediate postwar period to the present day documenting or re-imagining the partisan resistance. Novels, poems, songs, letters, diaries, and films. Visit to village of Sant' Anna di Stazzema GER:DB-Hum
4 units, Win (Springer, C)

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 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 73. On the Way to Fascism
Intellectual construction of Fascism through some focal novels, political essays and films. Novels by Gabrielle D'Annunzio, F.T. Marinetti, Curzio Malaparte, Emilio Lussu; Mussolini's political speeches; and Ezra Pound's notorious radio broadcasts. Giovanne Pastrone's 1914 film Cabiria and Bernardo Bertolucci's 1976 film Novecento. GER:DB-Hum
4 units, Spr (Resina, J)

OSPFLOR 74. Italy in the Foreign Imaginary
How Italy became in the 18th and 19th centuries the symbol of a decadent world where the vestiges of ancient civilization offered

insight into Western identity and a counterpoint to modernity. Addison's Remarks on Several Parts of Italy, Goethe's Italian Travels, Stendhal's Rome, Naples, and Florence, Washington Irving's Tales of a Traveler, Henry James' The Aspern Papers, Thomas Mann's Death in Venice, and texts by Freud, Benjamin, and Pound. Theories of tourism and the anthropology of travel. GER:DB-Hum

4 units, Spr (Resina, J)

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, Aut (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 94. Photography in Florence

Introduction to the functioning of the camera, exposure, and b/w film processing and printing. Emphasis is on perceptive imagery and the development of technical proficiency. 35mm camera required. Limited enrollment.

4 units, Win (Loverme, C)

OSPFLOR 97. Human Rights, Justice and Terrorism: Is the World Community Prepared to Prevent a Catastrophe?

Roosevelt's four freedoms, problematic notions of human rights, concept of fair trial, the U.S. Supreme Court decision on Guantanamo detainees, current international protection against torture and rape. Is current international protection satisfactory? Did victors' justice at Nuremberg serve any purpose? Is a jury necessary to establish guilt or innocence? What is genocide? How should post-conflict situations be handled? Why is the U.S. opposing the International Criminal Court? GER:DB-SocSci, EC-EthicReas

4 units, Spr (Vierucci, L)

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. In Italian. GER:DB-SocSci, EC-GlobalCom

4 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)

OVERSEAS STUDIES: KYOTO—SCTI (OSPKYOTO) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN KYOTO—SCTI

OSPKYOTO 9K. First-Year Japanese Language, Culture, and Communication B

5 units, Spr (Staff)

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)

OSPKYOTO 21. Research Project

Independent research projects on aspects of Japanese culture, society, or public policy. Students interested in developing the project as a web page should take a home campus class on creating web pages or have equivalent experience.

2-3 units, Spr (Staff)

OSPKYOTO 24. Japan in Contemporary International Affairs

Japanese foreign affairs since the end of the cold war. Evolution of the U.S.-Japan alliance, the rise of China, transformation of the security environment, and historical, strategic, geopolitical, economic, and cultural factors in Japan's new assertiveness in foreign relations. GER:DB-SocSci, EC-GlobalCom

5 units, Spr (Horvat, A)

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

GER:DB-EngrAppSci

5 units, Spr (Wong, S)

OSPKYOTO 55. Urban Dreams and Nightmares
International fiction from the 20s to the 90s with focus on the metropolis and urban life. Modern cities, urban crowds, and the innovative modes of cognition, perception, and behavior they trigger as literary theme. New techniques to describe the multiplicity of big cities and the transformation of self and community they required. Multicultural patchwork and global connectedness of large cities. Authors include Woolf, Dos Passos, Doblin, Kawabata, Robbe-Grillet, Lispector, Yamashita, Haruki Murakami, and Ryu Murakam. GER:DB-Hum
5 units, Spr (Heise, U)

OSPKYOTO 56. Technology, Ecology, and the Imagination of the future
Scientific and literary visions of the future from the 60s to the present. How visions of the future shape present-day attitudes and policies, and where scientific extrapolations and literary story lines converge or collide. Techniques from literary and cultural analysis to study stories and images about technology and the environment, emphasizing narrative theory, theories of metaphor, and risk theory. Media include Rachel Carson's *Silent Spring,* Al Gore's *An Inconvenient Truth,* and the computer game SimCity. GER:DB-SocSci
5 units, Spr (Heise, U)

OSPKYOTO 129K. Third-Year Japanese Language, Culture, and Communication B
5 units, Spr (Staff)

OSPKYOTO 211K. Upper Advanced Japanese
5 units, Spr (Staff)

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

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

UNDERGRADUATE STUDIES IN MADRID

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 SPANLANG or 11 or 21B more than two quarters (six months) prior to arriving in Madrid.
5 units, Aut, Win, 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: SPANLANG 11 or 21B within two quarters (six months) of arriving in Madrid, or 12 or 22B.
5 units, Aut, Win, 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, Win, 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. May be repeated for credit.
2 units, Aut (Murcia Cánovas, L), Win (Murcia Cánovas, L), Spr (Murcia Cánovas, L)

OSPMADRD 22. Spain on Stage: Theater and Performance in 2009
Students attend theater and analyze works currently in performance in Madrid, including canonical plays, and performances at smaller historical and alternative theaters. History of Spanish theater; background on the plays. Skills and strategies for reading dramatic works as literature and analyzing scenic languages of performance. GER:DB-Hum
5 units, Spr (Surwillo, L)

OSPMADRD 24. Spain and Africa through the Ages
Relationship between Spain and Africa from 711 to today, including Islamic culture perceived as an African phenomenon. Texts and topics include: Christian and Muslim chronicles of the invasion of 711; studies of Hispano-Islamic culture; chronicles of the Iberian exploration of Africa; Cartas marruecas; Carolina Coronado's poetry on the trans-Atlantic slave trade in the 19th century; Iván Larra's contemporary visual representations of Spain and blackness; and the film Saïd aout recent African immigration. GER:DB-Hum, EC-GlobalCom
3 units, Spr (Surwillo, L)

OSPMADRD 25. European Legal History
European law from the fall of the Roman Empire (5th century) to the establishment of the European Community (20th century). Organized chronologically, engaging with the sources and nature of law, the organization of legal systems and the relationship between law and society, law and lawmaker, law and the legal professions. Continental and English law. Sources include primary documents available in English. GER:DB-SocSci, EC-GlobalCom
5 units, Aut (Herzog, T)

OSPMADRD 26. Issues in European Law
Focus is on a period, an institution, or a doctrine in European law between the Middle Ages and the end of the 20th century. Topics chosen in consultation with the instructor.
4 units, Aut (Herzog, T)

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 34. Modern Spain
History of 19th- and 20th-century Spain including the Napoleonic wars, the liberal revolution, the birth and growth of workers parties, the emergence of nationalism, the Spanish Civil War, Franco's Spain, and the return of democracy. GER:DB-SocSci
5 units, Win (Herzog, T)

OSPMADRD 35. Issues in Spanish History
Focus is on a period, an institution, or a movement in Spanish history. Topics chosen in consultation with the instructor.
4 units, Win (Herzog, T)

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 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 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

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, Velázquez, Picasso and Dalí
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.

4 units, Aut (Sartarelli, S)

OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Amodóvar
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.

4 units, Spr (Tejerina-Canal, S)

OSPMADRD 56. Environmental Politics: Theory, Political Praxis, and the Spanish Case
Developments in environmental political theory and political practice in Spain. Philosophical and theoretical debates that resulted in the contemporary environmentalist political consciousness; history of the environmental political movement and the rise of environmentalist NGOs and green political parties; environmental politics in Spain with focus on policies in energy, water, and forest. GER:DB-SocSci

5 units, Aut (Seijo Macieras, F)

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 (de Lora del Toro, P)

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. Topics relevant to present-day Spain, including 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 67. Women in Spain: From Tradition to Postmodernity
Cultural discourses and practices on gender difference in Spain from medieval times to the present. Muslim, Jewish, and Christian women in Spanish medieval society. The ideal woman in early modern Spanish Empire; her spaces for freedom within her subjection. Enlightenment's shadows. Spanish feminism, the gender limits of liberalism, and the tyranny of national Catholicism. Postmodern democratic women: social reality and the media. GER:DB-SocSci, EC-Gender

5 units, Spr (Botella Ordinas, E)

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 Student 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)

OVERSEAS STUDIES: MOSCOW (OSPMOSC) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN MOSCOW

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)

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 75. Soviet and Post-Soviet Leaders
The role of the leader in the Soviet and post-Soviet systems, the role of personality and career trajectories in the making of leaders; the impact and legacies of Lenin, Stalin, Khrushchev, Brezhnev, Gorbachev, Yeltsin and Putin in Soviet and post-Soviet political culture. Core readings are biographies of these men. GER:DB-SocSci
5 units, Aut (Weiner, A)

OSPMOSC 76. Soviet History in Present-Day Russian Media
Presentations in the present-day Russian print and broadcast media of key events, such as the 1917 Revolution, the Great Terror, the Second World War, the Thaw, the so-called years of stagnation, and the collapse of the Soviet Union.
3 units, Aut (Weiner, A)

OSPMOSC 77. Russian Cinema: Peaks and Failures
Soviet and post-Soviet film, from art house to blockbuster, and from Oscar and Cannes winners *Burnt by the Sun* and *Russian Arc* to lesser known local productions such as *Bimmer* and *Brother-2*. Overview of contemporary Russian film directors.
5 units, Aut (Staff)

OSPMOSC 111M. Third-Year Russian
5 units, Aut (Filatova, G)

OSPMOSC 177M. Fourth-Year Russian
5 units, Aut (Staff)

OVERSEAS STUDIES: OXFORD (OSPOXFRD) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN OXFORD

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. Field trips; joint study trips to London and Florence. 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, Spr (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 (Cappocia, G)

OSPOXFRD 62. Heretics to Headscarves
Issues of religious toleration, diversity, and freedom of conscience, from their modern origins in the wake of the 16th-century Reformation to the current debate over the place of Islam in a highly secularized but historically Christian Britain and Europe. How persecutions and martyrdoms of the 16th and 17th centuries yielded to the tolerationist ethos of the 18th-century Enlightenment. Contemporary European debate over the public display of religious symbols. GER:DB-SocSci, EC-GlobalCom
5 units, Win (Rakove, J)

OSPOXFRD 63. Locke and his Legacy
Locke's life and leading works, emphasizing his political writings as they relate to ideas of resistance, religious toleration, property, and related topics. Focus is not only on what he wrote, but also how and why he wrote it, in an effort to explain the sources of his creativity. How to account biographically for the development of Locke's leading ideas. GER:DB-SocSci
5 units, Win (Rakove, J)

OSPOXFRD 66. Oxford: The Culture of the City
History and culture of cities in Britain from Roman times to the present, with Oxford as a case study. Impact of social and economic change on Oxford's planning and architecture in relation to British urban history. Visits to central and suburban locations to examine physical and social structures of the city and to Roman and Georgian Bath to provide contrast to Oxford. GER:DB-Hum
3 units, Aut (Chance, H), Win (Chance, H)

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.
3 units, Spr (Chance, H)

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
5 units, Spr (Tyack, G)

OSPOXFRD 86. Smallpox: Past, Present, and Future
England's role in the history of smallpox: from the introduction of the practice of variolation by Mary Wortley Montagu to Jenner's discovery of the world's first vaccine. Broad view of the virus, focusing on the history, biology, and policy issues. The nature and use of vaccination, smallpox as a model for disease eradication, international health, and the threat of smallpox as a biological

weapon. Visit to Edward Jenner's home in Berkeley and his statue in Hyde Park, London. GER:DB-NatSci, EC-GlobalCom
3 units, Spr (Siegel, R)

OSPOXFRD 88. Evolution of Darwin
Darwin as a lens through which to view society, history, science, and intellectual thought. Facets of Darwin's life and intellectual development, and the subsequent evolution of evolutionary thought to the present. Visits to the Darwin archive in Cambridge, Kew Gardens, the British Museum, Darwin's tomb, and Down House at the time of the 200th anniversary of Darwin's birth and the 150th anniversary of the publication of The Origin of the Species.
3 units, Spr (Siegel, R)

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, Aut (Kidd, H), Win (Kidd, H), Spr (Kidd, H)

OSPOXFRD 116Z. Close Readings in English Literature, 1642-1740
From the Civil War to the middle of the 18th century. The poetry, prose, and drama of the period in their literary, cultural, and historical contexts, and key texts. Open only to students majoring in English and related subjects. Taught jointly for Stanford students and second-year St. Catherine's undergraduates. GER:DB-Hum
5 units, Win (Bullard, P)

OSPOXFRD 154Z. Close Readings in English Literature, 1740-1832
Close Readings in English Literature, 1740-1832'Restricted to students majoring in English and related subjects. Taught jointly for Stanford and second-year St. Catherine's undergraduates. Texts beginning with William Collins and Thomas Gray and concluding with John Keats. GER:DB-Hum
5 units, Spr (Crawford, J)

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. Taught jointly with students from St. Catherine's College. GER:DB-Hum
5 units, Aut (Rowley, R)

OSPOXFRD 194. Second Oxford Tutorial
For students who want to take a second tutorial during a quarter in the Oxford program. Topics limited to economics, history, literature, philosophy, politics and international relations, and sociology. May be repeated for credit.
5 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPOXFRD 221Y. Art and Society in Britain
Themes in 18th-, 19th-, and 20th-century British art. Painting, sculpture, and design. Comparisons between the British experience and that of continental Europe and the U.S. Readings address questions related to the role of art in modern society. GER:DB-Hum
4-5 units, Win (Tyack, G)

OVERSEAS STUDIES: PARIS (OSPPARIS) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN PARIS

OSPPARIS 17. The Paris Art Practicum
Laboratory format to create works of art inspired by the local urban environment. Projects include: sonic scavenger hunts to record Paris' sound ecology as basis for electronic music works; solo and group performance art, and public poetry readings related to and staged throughout the city at idiosyncratic locations; temporary public visual art such as chalk art; bricolage art projects that result in sculpture and two-dimensional visual art constituted by found objects salvaged from the Parisian cityscape. No experience required.
3-4 units, Win (Applebaum, M)

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. Resumé writing and interview preparation in French. Official letter writing in French.
1 unit, Aut (Habert, L), Win (Habert, L)

OSPPARIS 21. Contemporary Art in Paris: A Trans-Idiomatic Survey
Current state of the arts in Paris through an examination of its cultural offerings. Visits to concerts, museums, research facilities, and events throughout the city serve as catalysts for critical discussions, an understanding of the manner in which artistic media operate, and a comparison of the expressive parameters in each medium. Current trends in architecture, opera, experimental music, jazz, popular music, painting, sculpture, installation art, photography, film, dance, and cuisine.
3 units, Win (Applebaum, M)

OSPPARIS 22P. Intermediate French I
4 units, Aut (Reychman, P), Win (Mercier, F), Spr (Reychman, P)

OSPPARIS 23P. Intermediate French II
4 units, Aut (Mercier, F), Win (Gourevitch, S), Spr (Habert, L)

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 (Halevi, E; Molkou, E), Win (Halevi, E; Molkou, E), Spr (Halevi, E; Molkou, E)

OSPPARIS 25. Literature and the City
Subtle and hidden aspects of Paris through the eyes of France's greatest writers, poets, and philosophers including Balzac, Baudelaire, Zola, and Aragon. Essays, poems, and novels that portray the historical, social, and political realty of the city better than textbooks or guides. GER:DB-Hum
4 units, Aut (Guyot, S)

OSPPARIS 28. Performing in French
Students participate in every aspect of theater presentation, including study of texts, scene work, stage management, and acting. Possible-end-of quarter performance in a Parisian theater house. Objectives: explore French theater and texts through dramatic processes; improve French language skills and pronunciation; immersion in a collaborative and bicultural project with French students from other institutions in Paris. No experience required. In French.
3 units, Spr (Poirson, M)

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; Keppler, J; Leguet, B)

OSPPARIS 40P. Introductory Electronics
GER:DB-EngrAppSci
5 units, Aut (Howe, R), Spr (Wong, S)

OSPPARIS 41. EAP: Perspective, Interior Decorating, Volume, and Design
May be repeated for credit.
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 42. EAP: Drawing with Live Models
May be repeated for credit.
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 43. EAP: Painting and Use of Color
May be repeated for credit.
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 44. EAP: Graphic Art
May be repeated for credit.
2 units, Aut (Staff), Win (Staff), Spr (Staff)

OSPPARIS 50P. Introductory Science of Materials
GER:DB-EngrAppSci
4 units, Aut (Staff), Win (Staff), Spr (Staff)

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, Spr (Boussaguet, L)

OSPPARIS 66. Classical Paris
How modern Paris has been shaped by the classical past. The cultures of Athens and Rome as models for architecture, urban design, literature, art, sport, and the everyday culture of university, cafe, and boulevard. Site visits demonstrate the web of French cultural connections that keep the ancient past alive and include: the Louvre, the Roman baths at Cluny; and the Hippodrome. GER:DB-Hum
3-5 units, Aut (Martin, R)

OSPPARIS 67. Representation of the Domestic in the Louvre
Conceptions and visual representation of the domestic in Greek, Dutch, and French art displayed at the Louvre. Social, cultural, and artistic contexts in which the representation of the domestic was established in 17th-century Holland and its relationship to contemporary French thought. Domestic scenes of Jean-Baptiste-Simeon Chardin as framework for analysis of French culture and civilization of the 18th century. GER:DB-Hum, EC-Gender
3-5 units, Aut (Peponi, A)

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 84. Foundations of French Political Culture: the French Revolution
Salient features of French political culture, as they appeared in the efforts of the French Revolution to destroy the absolute monarchy that preceded it. Cultural foundations of the old regime and relationship between claims of absolute monarchy and assumptions of a corporate social order. Evolution of the revolutionary dynamic and the appearance of the Terror. How the experience and memory of the French Revolution have shaped French notions of citizenship, education, national identity and other aspects of contemporary French life.
5 units, Spr (Baker, K)

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 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 120X. French Painting in the 19th Century: Between Tradition and Revolution
Changes in artistic aims and the interaction between artist and society throughout the period. Weekly field trips to Paris museums holding paintings of David, Ingres, Delacroix, Courbet, Daumier, Manet, Renoir, Monet, Degas, and others. GER:DB-Hum
4 units, Win (Halevi, E)

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 (Guedon, P)

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 (Molkou, E), Spr (Molkou, E)

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, Win (Fessler, J)

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 (Guyot, S)

OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France
The institutions of the Fifth Republic, the main political forces, and their evolution. Electoral behavior, taking into account other forms of political action such demonstrations and protests. Attitudes and values are linked to voting choice. GER:DB-SocSci, EC-GlobalCom
4-5 units, Aut (Muxel, A; Strudel, S)

OVERSEAS STUDIES: SANTIAGO (OSPSANTG) COURSES

For information on the Bing Overseas Studies Program, see the "Overseas Studies Program" section of this bulletin.

OVERSEAS STUDIES IN SANTIAGO

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, Win (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)

OSPSANTG 17. Chilean Fiction of the 20th Century
Novels and short stories. Chilean and Latin American political and economic history contexts. GER:DB-Hum

4-5 units, Spr (Missana, S)

OSPSANTG 33. Spanish Language Tutorial
Prerequisite: two years of college Spanish or equivalent placement.

2 units, Aut (Abad, M; Pons, H), Win (Abad, M; Pons, H), Spr (Abad, M; Pons, H)

OSPSANTG 43. Topics in Human Genetics
Independent projects in the following areas: genetic testing leading to identification of children of missing persons (Argentina); screening for inherited diseases; fragile X syndrome; ancestry determination; direct-to-consumer genetic testing.

3 units, Win (Francke, U)

OSPSANTG 44. Human Genetic Diversity in Individuals and Populations
Issues of human genetics and society from a global perspective, with examples specific to Latin America. Topics include: types of genetic variation leading to individual and ancestry identification; heritable and de novo disorders of development; adult-onset disease predisposition; differential susceptibility to infections and environmental agents; and different responses to drugs. Principles and types of genetic testing; access and utilization of genetic information; methods, results, and outcome interpretation of genomic analyses and implications for public policy.

4-5 units, Win (Francke, U)

OSPSANTG 45. The Cinema of the Chilean Transition (1990-2007)
Nature of the dialogue filmmakers sought to establish with the audience during time of democratic peace. Themes include: delinquency (Lubbert's *Taxi para tres*); presence or absence of indigenous people (Alicia Scherson's *Play*); family dynamics (Sebastián Lelio's *La sagrada familia*); social protagonism of women (Quercia's *Geografía del deseo*); relationship between art and commerce (Caiozzi's *Cachimba*); use of the thriller and noir genres (Hidalgo's *El huesped*; Olguin's *Sangre eterna*). GER:DB-Hum

3-5 units, Aut (Ruffinelli, J)

OSPSANTG 46. Topics in Chilean Cultural Expressions
Independent study in one of the following topics: 20th-century Chilean poetry such as Neruda and Nicanor Parra; Chilean novelists such as Donoso, Skarmeta, and Allende; trends in Chilean culture including theater, music, peñas, sports, and arts; cultural journalism or how daily newspapers reflect on Chilean popular interests.

3-5 units, Aut (Ruffinelli, J)

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 (Reid, S), Win (Reid, S)

OSPSANTG 62. Topics in Chilean History
Main themes of Chilean history: Spanish colonial background; independence in comparative perspective; construction of the republic in the 19th century; actors in the political process; the clash between authoritarian and democratic traditions in the 20th century. How Chileans have viewed their own history through conventional historical accounts, novels, and memoirs. GER:DB-Hum

4-5 units, Win (Jaksic, I)

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 (Staff), Spr (Staff)

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 (Munoz, O)

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 (Fuentes, C)

OSPSANTG 130X. Latin American Economies in Transition
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 (Briones, I)

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 160X. Latin America in the International Economy
The external economic relations of Latin American countries. Similarities and differences among countries, focusing on the last 15 years. Analytical and empirical elements for interpretation of policies, and the outcome. Trade, external debt, capital flows, and the inter-relationships between domestic economy and overall growth. Recommended: ECON 1, 51, and 52. GER:DB-SocSci
5 units, Win (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

For information on graduate programs in Pathology, see the "Pathology" section of this bulletin. Course and laboratory instruction in the Department of Pathology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN PATHOLOGY

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. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor.
4 units, Spr (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, Win (Michie, S)

PATH 105Q. Final Analysis: The Autopsy as a Tool of Medical Inquiry
Stanford Introductory Seminar. Preference to sophomores. Based on review of patient medical histories and examination of formalin-fixed and unfixed tissues from autopsy. Student-directed problem-solving; students develop learning objectives for each case, and present findings. The effect of disease on normal structure and function, ethics of patient care, allocation of medical resources, efficiency of therapy, and medical error. Prerequisite: hepatitis-B vaccination; free vaccinations during the winter for accepted students.
3 units, Spr (Regula, D)

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 GENE 206.) For graduate students; undergraduates by consent of instructor. 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 20s 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: background in genetics and molecular biology.
2 units, alternate years, not given this 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 218. Computational Analysis of Biological Images
Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy.

2 units, alternate years, not given this year

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, alternate years, not given this year

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 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)

PEDIATRICS (PEDS) COURSES

Only Stanford Introductory Seminars open to undergraduates are listed. See http://medcatalog.stanford.edu/ for additional offerings.

UNDERGRADUATE COURSES IN PEDIATRICS

PEDS 111Q. Issues of Race and Ethnicity in the Health of Children
Stanford Introductory Seminar. Preference to sophomores. Medicine and pediatrics from a public-health, evidence-based perspective. How research methods unmask health issues for at-risk racial and ethnic groups of children. Determinants of health with regard to race and ethnicity and ideas for changes in public policy. Students identify an area of interest and proposed intervention.

3-4 units, Aut (Burgos, A)

PHILOSOPHY (PHIL) COURSES

For information on undergraduate and graduate programs in the Department of Philosophy, see the "Philosophy" section of this bulletin.

UNDERGRADUATE COURSES IN PHILOSOPHY

PHIL 100-103 are surveys of important figures and movements in Western philosophy. Other courses in the 100+ range cover particular periods, movements, and figures in the history of philosophy. Prospective Philosophy majors should take as many as possible during the sophomore year.

PHIL 10. God, Self, and World: An Introduction to Philosophy
Traditional philosophical problems including the existence of God, how and what one can know about the world, how to understand the nature of the mind and its relation to the body, and whether people have free will. Paradoxes. Readings include classical and contemporary texts. GER:DB-Hum

5 units, Aut (Duarte, S)

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, Win (De Pierris, G)

PHIL 13N. Freedom of the Will and Moral Responsibility
Stanford Introductory Seminar. Preference to freshmen. Historical and contemporary views on this central philosophical problem: in order to be morally responsible, do people have to have free will? If so, then would the premise that all events are causally determined make such freedom impossible?

3 units, Spr (Schapiro, T)

PHIL 14N. Belief
Stanford Introductory Seminar. Preference to freshmen. Is there anything wrong with believing something without evidence? Is it possible? The nature and ethics of belief, and belief's relation to evidence and truth. How much control do believers have over their belief? GER:DB-Hum

3 units, Win (Lawlor, K)

PHIL 15N. Freedom, Community, and Morality
Stanford Introductory Seminar. Preference to freshmen. Does the freedom of the individual conflict with the demands of human community and morality? Or, as some philosophers have maintained, does the freedom of the individual find its highest expression in a moral community of other human beings? Readings include Camus, Mill, Rousseau, and Kant. GER:DB-Hum, EC-EthicReas

3 units, Aut (Friedman, M)

PHIL 19N. Practical Reasoning
Stanford Introductory Seminar. Preference to freshmen. Practical reasoning aims. Structure of practical reasoning. Practical reasoning as means to ends that are taken as given. Practical reasoning about ends. Practical reasoning concerned with some sort of maximization of some value. Relation between practical reasoning and desire. Relation between practical reasoning and planning. Relation between different views about practical reasoning and different views about morality. Structure of practical reasoning affected by perceptions of subtle features of different situations.

3 units, Win (Bratman, M)

PHIL 20. 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. GER:DB-Hum, EC-EthicReas

5 units, Win (Schapiro, T)

PHIL 20S. Introduction to Moral Philosophy
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.
3 units, Sum (McElroy, P)

PHIL 30. Introduction to Political Philosophy
(Same as ETHICSOC 30, POLISCI 3, PUBLPOL 103A.) State authority, justice, liberty, and equality through major works in political philosophy. Topics include human nature and citizenship, the obligation to obey the law, democracy and economic inequality, equality of opportunity and affirmative action, religion, and politics. GER:DB-Hum, DB-Hum, EC-EthicReas
5 units, Spr (Hussain, N)

PHIL 41Q. Truth
Stanford Introductory Seminar. Preference to sophomores. Central issues animating current work in the philosophy of truth. What is truth? What is it about a statement or judgment that makes it true rather than false? Are there any propositions that are neither true nor false? Could truth be relative to individuals or communities? Do people have different notions of truth for different enterprises such as mathematics and ethics? Might truth be a matter of degree? Sources include the instructor's book manuscript and other contemporary writers.
3 units, Aut (Burgess, A)

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.
4 units, Win (Burgess, A)

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, Sum (Papadopol, A)

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, Win (Paul, S), Spr (Duarte, S)

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.
4 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, Aut (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 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, Sum (Staff)

PHIL 77. Methodology in Ethics: Translating Theory into Practice
(Same as ETHICSOC 77.) Ideally, social policies are informed by ethical thought and reflection, but doing good in the world requires the active translation of moral theory and political philosophy into action. What kinds of empirical data are relevant to social decision making, and how should they be collected, evaluated, and integrated into normative analysis? What assumptions about human nature are in play? How should diverse cultural values be addressed? Case studies from biomedical science, business, and government.
4 units, not given this year

PHIL 78. Medical Ethics
(Same as ETHICSOC 78.) Introduction to moral reasoning and its application to problems in medicine: informed consent, the requirements and limits of respect for patients' autonomy, surrogate decision making, euthanasia and physician-assisted suicide, and abortion. GER:DB-Hum, DB-Hum, EC-EthicReas
4 units, not given this year

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 (Crimmins, M), Spr (Burgess, A)

PHIL 81. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

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, Aut (Duarte, S)

PHIL 101. Medieval Religious Philosophy
(Same as RELIGST 167.) Focus is 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, and semiotics. Readings from Augustine, Anselm, Aquinas, Scotus, and Ockham. GER:DB-Hum
4 units, not given this year

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, Win (Duarte, S)

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, not given this year

PHIL 107. Plato and Heraclitus
(Same as PHIL 207.) Similarities and differences.
3 units, not given this year

PHIL 110. Plato
(Same as PHIL 210.) Plato's *Republic*. GER:DB-Hum
4 units, Aut (Bobonich, C)

PHIL 111. Aristotle
(Same as PHIL 211.) Aristotle's epistemology; related issues in his psychology and philosophy of science. GER:DB-Hum
4 units, Win (Bobonich, C)

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
(Same as PHIL 215.) Is a science of metaphysics possible? What is a Aristotelian science? How does science get started? How are the most basic principles of scientific thinking known? If the special sciences cover every particular subject, as chemistry deals with substantial change and meteorology with accidental change, then what is the subject of the general science of metaphysics? Can it be unified? Answers by Aristotle, Aquinas, Duns, Scotus, and Ockham. 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, Win (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 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 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, Spr (De Pierris, G)

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, not given this year

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, Win (Hills, D)

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.
4 units, not given this year

PHIL 130. Hegel's Elements of Philosophy of Right
(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, not given this year

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 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. GER:DB-Hum
4 units, Spr (Hills, D)

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, Aut (Follesdal, D)

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 (Pacuit, E)

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 (Pacuit, E)

PHIL 153. Feminist Theories and Methods Across the Disciplines
(Same as FEMST 103, FEMST 203.) 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, Aut (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 (vanBenthem, J)

PHIL 155. General Interest Topics in Mathematical Logic
Propositional calculus, Sudoku puzzles, problem P=NP. Possible worlds, modal logic. Incompleteness, provability logic. Logic of knowledge and belief. May be repeated for credit.
4 units, Win (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, Spr (Pacuit, E)

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, Win (Smith, G)

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, Spr (Smith, G)

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.
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 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, Win (Smith, G)

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, Aut (Ryckman, T)

PHIL 166. Probability: Ten Great Ideas About Chance
(Same as PHIL 266.) 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, Spr (Skyrms, B)

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.
4 units, not given this year

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 170. Ethical Theory
(Same as ETHICSOC 170, PHIL 270.) Major strands in contemporary ethical theory. Readings include Bentham, Mill, Kant, and contemporary authors. GER:DB-Hum, EC-EthicReas
4 units, Aut (Schapiro, T)

PHIL 171. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 271, POLISCI 136S, PUBLPOL 207.) 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.
4 units, not given this year

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, Aut (Hills, D)

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, Win (Satz, D)

PHIL 175. Philosophy of Law

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, Spr (Bratman, M)

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 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 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 179. Semantics: Theories of Meaning

(Same as PHIL 279.) What makes ambiguity, polysemy, and context sensitivity needed in natural languages; why this is not the case with formal languages. How to develop semantics for context-sensitive structures. GER:DB-Hum

4 units, not given this year

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. Meta-metaphysics. 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.

4 units, Spr (Crimmins, M)

PHIL 182. Truth

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 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, Win (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.

4 units, Spr (Maguire, L)

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 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, not given this year

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.
4 units, Spr (Paul, S)

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, Win (Bratman, M)

PHIL 190. Introduction to Cognitive and Information Sciences
(Same as LINGUIST 144, PSYCH 132, SYMBSYS 100.) The history, foundations, and accomplishments of the cognitive sciences, including presentations by 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 (Wasow, T; Roberts, E)

PHIL 193H. The Art of the Movies: Story, Drama, and Image
(Same as HUMNTIES 193H.) 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.
4 units, Aut (Hills, D)

PHIL 193W. Nietzsche, Doestoevsky, and Sartre
(Same as HUMNTIES 193W.) 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 194E. Undergraduate Seminar: Ethical Antitheory
May be repeated for credit.
4 units, not given this year

PHIL 194L. W.E.B. DuBois as Writer and Philosopher
(Same as AFRICAAM 152, ENGLISH 152D.) Capstone seminar for Philosophy and Literature programs. Preference to majors in English, Philosophy, African and African American Studies, or the Philosophy and Literature programs. Life, career, thought, and writings of DuBois. Focus on the first half of his career, interactions among his early philosophical perfectionism, his work in social theory/social science, and his literary ambitions as an essayist and novelist. Sources include *Souls of Black Folk*, as well as his books on history and sociology, scholarly essays, and novels. GER:DB-Hum
5 units, Spr (Elam, M; Anderson, L)

PHIL 194P. Naming and Necessity
Saul Kripke's lectures on reference, modal metaphysics, and the mind/body problem.
4 units, Win (Burgess, A)

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, Aut (Lawlor, K)

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
5 units, Aut (Burgess, A), 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)
1 unit, Aut (Staff), Win (Staff), Spr (Staff)

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 (Staff)

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, Spr (Staff)

GRADUATE COURSES IN PHILOSOPHY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PHIL 207. Plato and Heraclitus
(Same as PHIL 107.) Similarities and differences.
3 units, not given this year

PHIL 210. Plato
(Same as PHIL 110.) Plato's Republic.
4 units, Aut (Bobonich, C)

PHIL 211. Aristotle
(Same as PHIL 111.) Aristotle's epistemology; related issues in his psychology and philosophy of science.
4 units, Win (Bobonich, C)

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
(Same as PHIL 115.) Is a science of metaphysics possible? What is a Aristotelian science? How does science get started? How are the most basic principles of scientific thinking known? If the special sciences cover every particular subject, as chemistry deals with substantial change and meteorology with accidental change, then what is the subject of the general science of metaphysics? Can it be unified? Answers by Aristotle, Aquinas, Duns, Scotus, and Ockham.
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, Win (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 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 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, Spr (De Pierris, G)

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, not given this year

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, Win (Hills, D)

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; Kant's theory of race.

4 units, not given this year

PHIL 228. Fichte's Ethics
(Same as PHIL 128..) The founder of the German Idealist movement who 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, not given this year

PHIL 230. Hegel's Elements of Philosophy of Right
(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, not given this year

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 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 (Staff)

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.

2-3 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, Aut (Follesdal, D)

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, not given this year

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 (Pacuit, E)

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 (Pacuit, E)

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 (vanBenthem, 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, Spr (Pacuit, E)

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, Win (Smith, G)

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, Spr (Smith, G)

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, Win (Smith, G)

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, Aut (Ryckman, T)

PHIL 266. Probability: Ten Great Ideas About Chance
(Same as PHIL 166.) 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, Spr (Skyrms, B)

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, not given this year

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 270. Ethical Theory
(Same as ETHICSOC 170, PHIL 170.) Major strands in contemporary ethical theory. Readings include Bentham, Mill, Kant, and contemporary authors.
4 units, Aut (Schapiro, T)

PHIL 271. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 171, POLISCI 136S, PUBLPOL 207.) 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 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, Win (Satz, D)

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 276B. The Economic Individual in the Behavioral Sciences
(Same as PHIL 176B. Graduate students register for 276B.)
4 units, not given this year

PHIL 279. Semantics: Theories of Meaning
(Same as PHIL 179.) What makes ambiguity, polysemy, and context sensitivity needed in natural languages; why this is not the case with formal languages. How to develop semantics for context-sensitive structures.
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, 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, Spr (Crimmins, M)

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, Win (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 (Paul, S)

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, Win (Bratman, M)

PHIL 312. Aristotle's Psychology
De Anima and parts of *Parva Naturalia*.
4 units, not given this year

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. Aristotle's Metaphysics
Aristotle's views about substance and the nature and possibility of metaphysics. Focus is on *Categories* and *Metaphysics Book Zeta*.
3 units, Win (Bobonich, C)

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.
4 units, Spr (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, Aut (Anderson, L)

PHIL 325. Modern Seminar
(Same as HUMNTIES 325.) Modern anxieties about the place of human concerns within a disenchanted natural world, focusing on texts of philosophy, social theory, and imaginative literature. Cultural and psychological consequences of perceived decline in and

threats to religious faith. Authors may include Schiller, Schopenhauer, Coleridge, Kierkegaard, Marx, Baudelaire, Darwin, Nietzsche, Weber, Eliot, Woolf, Sartre, and Camus.

3-5 units, Spr (Anderson, L)

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.

4 units, not given this year

PHIL 334. Habermas

Does Habermas have a distinctive account of normativity and normative judgements?

3-5 units, Spr (Hussain, N)

PHIL 335. Topics in Aesthetics

May be repeated for credit.

4 units, not given this year

PHIL 336. Marx and Weber

(Same as POLISCI 336M.) How Marx and Weber each developed theories to account for the political problems of unfreedom, inequality, oppression, and bureaucratization; investigated the extent to which such problems could be mitigated or resolved; and believed that social science could contribute to understanding the modern world and efforts to change it. Their works with reference to politics, human agency, social change, and the role of knowledge.

4 units, Spr (Satz, D)

PHIL 338. Hobbes and Rousseau

(Same as POLISCI 338J.) On human nature, freedom, equality, and political authority in Hobbes's *Leviathan* and Rousseau's *Discourse on Inequality* and *Social Contract*.

3 units, Aut (Cohen, J)

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 someone'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, Aut (Perry, J)

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, Spr (Staff)

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, Aut (Pacuit, E)

PHIL 350B. Finite Model Theory

(Same as MATH 290B.) Classical model theory deals with the relationship between formal languages and their interpretation in finite or infinite structures; its applications to mathematics using first-order languages. The recent development of the model theory of finite structures in connection with complexity classes as measures of computational difficulty; how these classes are defined within certain languages that go beyond first-order logic in expressiveness, such as fragments of higher order or infinitary languages, rather than in terms of models of computation.

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, Aut (Mints, G)

PHIL 351B. Constructive Mathematics

Effective and non-effective proofs. Background from constructive logic and computability. Elementary constructive analysis, recursive analysis. Constructive models. Foundational issues. May be repeated for credit. Prerequisites: 151, 152, or equivalents, and a calculus class.

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: PHIL160A,B, and MATH 161, or equivalents.

3 units, not given this year

PHIL 352B. Set Theory

(Same as MATH 292B.) 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: PHIL160A,B, and MATH 161, or equivalents.

3 units, not given this year

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. Higher-Order Logic

Second-order and general higher-order logic. Expressive power and failure of classical theorems such as axiomatizability, compactness, and Loewenheim-Skolem. Different systems of higher-order logic, including type theory. Proof theory and completeness over general models. History of type theory as an alternative foundation of mathematics. Applications in computer science and linguistics. Prerequisite: 151. Recommended: 152.

3 units, not given this year

PHIL 354. Topics in Logic

Readings on uses of proof theory in analysis and number theory. Proof mining: extraction of bounds from non-effective proofs, uniformity results. May be repeated for credit. Prerequisites: 151, 152, or equivalents, and a 100-level MATH course.

3 units, Win (Mints, G)

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. Recommended: modal logic; game theory.

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, not given this year

PHIL 360. Core Seminar in Philosophy of Science
Limited to first- and second-year Philosophy Ph.D. students.

4 units, Win (Friedman, M; Longino, H)

PHIL 365. Seminar in Philosophy of Science: Time

4 units, Win (Ryckman, T)

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, Spr (Skyrms, B)

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 372. Problems in Kantian Ethics
May be repeated for credit.

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, Aut (Staff)

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 374D. Religion and the Constitution
(Same as POLISCI 336T. Same as LAW 569.) Issues of religious toleration in political theory and in American constitutional law. Topics include: whether religion merits special the special constitutional solicitude provided by the First Amendment's religion clauses; religion as distinct from culture, morality, and philosophy as understood for constitutional purposes; the tensions between ensuring free exercise and avoiding religious establishment; cases for and against free exercise exemptions; and whether the religion clauses can be understood as serving a single fundamental value such as liberty,equality, or neutrality. Readings from political and constitutional theory including Bodin, Locke, Madison, Jefferson, Rawls, Nussbaum, McConnell, Okin, Choper, Hamburger, and constitutional cases.

3-5 units, Win (Cohen, J; Sullivan, K)

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. Problems in Medical Ethics
Focus is on recent philosophical work concerning the moral status of non-paradigmatic human beings such as fetuses or Alzheimer's patients, and non-ideal conditions of decision making such as concretized emotions or exploitation. Prerequisite: 170 or equivalent.

4 units, not given this year

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.

4 units, not given this year

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, Aut (Perry, J)

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 383. Philosophy of Mind Seminar
May be repeated for credit.

4 units, not given this year

PHIL 384. Seminar in Metaphysics and Epistemology
May be repeated for credit.

4 units, Spr (Burgess, A)

PHIL 385. Philosophy of Language Seminar: Foundations of Non-Factualism
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, not given this year

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 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, Aut (Follesdal, D)

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 387S. Practical Reasons and Practical Reasoning
Attempts to develop alternatives to Humean, instrumentalist conceptions of practical reasoning, and alternatives to Humean, non-cognitivist 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.
4 units, not given this year

PHIL 389. Advanced Topics in Epistemology
Skepticism and contextualism, epistemic closure, and problems generated by closure.
4 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, Spr (Mints, G; Feferman, S)

PHIL 450. Thesis
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 Ph.D. Proseminar
Presentation of dissertation work in progress by seminar participants. May be repeated for credit.
1 unit, Aut (Staff), Win (Crimmins, M), Spr (Crimmins, M)

PHYSICS (PHYSICS) COURSES

For information on undergraduate and graduate programs in the Department of Physics, see the "Physics" section of this bulletin.

PHYSICS COURSE CATALOG NUMBERING SYSTEM

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
50	elementary particle physics
60	astrophysics, cosmology, gravitation
70	condensed matter physics
80	optics and atomic physics
90	miscellaneous courses

UNDERGRADUATE COURSES IN PHYSICS

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, 43, 44, 45, 46) is for students of engineering, chemistry, earth sciences, mathematics, or physics. The advanced freshman series (61, 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.

PHYSICS 11N. The Basic Rules of Nature
Stanford Introductory Seminar. Preference to freshmen. The development by physicists of descriptions of the behavior of matter on microscopic scales and scales characteristic of the Universe as a whole, including quantum mechanics, particle physics, and general relativity. Promising approaches that physicists are using to shed light on remaining mysteries, including string theory and M theory. Discussions are semiquantitative. Prerequisite: high school physics or equivalent. GER:DB-NatSci
3 units, Win (Susskind, L)

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 (Romani, R), 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, Win (Linde, A)

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 (Abel, T)

PHYSICS 18. Revolution in Concepts of the Cosmos
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. Enrollment limited to 20.
1 unit, not given this year

PHYSICS 18N. Revolutions in Concepts of the Cosmos
Stanford Introductory Seminar. Preference to freshmen. The evolution of the concept 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. Enrollment limited to 20 in one section. 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, Aut (Manoharan, H)

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 (Linde, A)

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 (Linde, A)

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 (Wojcicki, S)

PHYSICS 24. Electricity and Optics Laboratory
Focus is on electrodynamics circuits. Pre- or corequisite: 23.
1 unit, Win (Wojcicki, S)

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 (Burchat, P)

PHYSICS 25S. Modern Physics with Laboratory
Equivalent to 25 and 26. GER:DB-NatSci
4 units, Sum (Fisher, G)

PHYSICS 26. Modern Physics Laboratory
Pre- or corequisite: 25.
1 unit, Spr (Burchat, P)

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
Stanford Introductory Seminar. Preference to freshman. Additional topics for students in PHYSICS 41 such as tidal forces, gyroscopic effects, fractal dimensions, and chaos. Corequisite: 41.
1 unit, Win (Abel, T)

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
(Formerly 56.) 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 (Staff)

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 consent of instructor.
1 unit, Aut (Susskind, L)

PHYSICS 46. Light and Heat Laboratory
Pre- or corequisite: 45.
1 unit, Aut (Gratta, G), Sum (Staff)

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. No previous physics required. Limited enrollment. Lab. GER:DB-NatSci, DB-NatSci
3 units, Aut (Funk, S), Sum (Staff)

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 (Michelson, P)

PHYSICS 61. Mechanics and Special Relativity
For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. The fundamental structure of classical physics including Newtonian mechanics, electricity and magnetism, waves, optics, thermodynamics. Foundations of modern physics including special relativity, atomic structure, quantization of light, matter waves and the Schodinger equation. Diagnostic quiz in calculus and conceptual Newtonian mechanics at first meeting to decide if course is appropriate; some students may benefit more from the 40 series. Prerequisites: high school physics and familiarity with calculus (differentiation and integration in one variable); pre- or corequisite MATH 42. GER:DB-NatSci
4 units, Aut (Blandford, R)

PHYSICS 63. Electricity, Magnetism, and Waves
Recommended for prospective Physics majors or those interested in a rigorous treatment of physics. The fundamental structure of classical physics including Newtonian mechanics, Lagrangian mechanics, special relativity, and electricity and magnetism. Diagnostic quiz in calculus and conceptual Newtonian mechanics at first meeting of 61 to help students decide if course is appropriate; some students may benefit more from the 40 series. Prerequisites: high school physics and familiarity with calculus (differentiation and integration in one variable); pre- or corequsite: MATH 42. GER:DB-NatSci
4 units, Win (Allen, S)

PHYSICS 64. Advanced Electromagnetism Laboratory
Experimental work in mechanics, electricity and magnetism. Corequisite 63.
1 unit, Win (Allen, S)

PHYSICS 65. Thermodynamics and Foundations of Modern Physics
Recommended for students contemplating a major in Physics or interested in a more rigorous treatment of physics. The structure of classical physics including Newtonian mechanics, Lagrangian mechanics, special relativity, and electricity and magnetism; topics in heat and light and an introduction to modern physics. Diagnostic quiz in calculus and conceptual Newtonian mechanics at first meeting of 61 to help students decide if course is appropriate; some students may benefit more from the 40 series. Prerequisites: high school physics and familiarity with calculus (differentiation and integration in one variable); pre- or corequsite: MATH 42. GER:DB-NatSci
4 units, Spr (Fetter, A)

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 particle physics. Intended as preparation for PHYSICS 105, 107, 108. Lecture plus laboratory format. Required for 60 series Physics majors; recommended for 40 series students who intend to major in Physics. Corequisite: 65 or 43. (Fisher)

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 84Q. The Rise of the Machines
Stanford Introductory Seminar. Preference to sophomores. Key experiments in the history of particle physics and astrophysics. Evolution and innovation in detector and accelerator technologies that enabled these experiments. The fundamental structure and interactions of matter. Recommended: some high school or introductory college physics.

3 units, Spr (Schindler, R)

PHYSICS 87N. The Physics of One: Nanoscale Science and Technology
Stanford Introductory Seminar. 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, Win (Manoharan, H)

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 25, 65, or 70; and consent of instructor. GER:DB-NatSci

4 units, Spr (Church, 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 (Kapitulnik, A), Spr (Goldhaber-Gordon, D)

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 (Kuo, C)

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. MATH 131.

4 units, Win (Kachru, S)

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
Vector analysis, electrostatic fields, including multipole expansion; dielectrics. Special relativity and transformation between electric and magnetic fields. Maxwell's equations. Static magnetic fields, magnetic materials. Electromagnetic radiation, plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadrupole radiation. Wave guides and cavities. Prerequisites: 43 or 63; concurrent or prior registration in MATH 52 and 53. Recommended: concurrent or prior registration in 112.

4 units, Win (Cabrera, B)

PHYSICS 121. Intermediate Electricity and Magnetism
Vector analysis, electrostatic fields, including multipole expansion. Dielectrics, static magnetic fields, magnetic materials. Maxwell's equation. Electromagnetic radiation. Special relativity and transformation between electric and magnetic fields. Plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadrupole radiation and their frequency and angular distributions. Scattering synchrotron and bremsstrahlung processes. Energy loss in water. Wave guides and cavities. Prerequisites: 120; concurrent or prior registration in MATH 131. Recommended: 112.

4 units, Spr (Petrosian, V)

PHYSICS 130. Quantum Mechanics
The origins of quantum mechanics, wave mechanics, and the Schrödinger equation. Heisenberg's matrix formulation of quantum mechanics, solutions to one-dimensional systems, separation of variables and the solution to three-dimensional systems, the central field problem and angular momentum eigenstates, spin and the coupling of angular momentum, Fermi and Bose statistics, time-independent perturbation theory. Prerequisites: 70, 110; pre- or corequisites: 120, 121, and MATH 131.

4 units, Aut (Kivelson, S)

PHYSICS 131. Quantum Mechanics
The origins of quantum mechanics, wave mechanics, and the Schrödinger equation. Heisenberg's matrix formulation of quantum mechanics, solutions to one-dimensional systems, separation of variables and the solution to three-dimensional systems, the central field problem and angular momentum eigenstates, spin and the coupling of angular momentum, Fermi and Bose statistics, time-

independent perturbation theory. Prerequisites: 70, 110; pre- or corequisites: 120, 121, and MATH 131.

4 units, Win (Wacker, J)

PHYSICS 134. Advanced Topics in Quantum Mechanics
Variational principle, time-dependent perturbation theory, WKB approximation. Scattering theory: partial wave expansion, Born approximation. Nature of quantum measurement: EPR paradox, Bell's inequality, and Schrödinger's cat paradox. Additional topics may include relativistic quantum mechanics or quantum information science. Prerequisites: 130, 131.

4 units, Spr (Moler, K)

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.

4 units, Win (Dixon, L)

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 (Dixon, L)

PHYSICS 153B. Introduction to String Theory II: Open Strings and D-branes
Emergence of gauge theory and connections to particle physics. String thermodynamics and black holes. T-duality, string compactification, and stringy modifications of geometry. Prerequisites: 130, 131, and 153A.

4 units, given once only

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 (Petrosian, V)

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
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, and internal energy; entropy; reversibility; applications to various properties of matter; and absolute zero and low-temperature phenomena. Corequisite: 130.

4 units, Aut (Goldhaber-Gordon, D)

PHYSICS 171. Thermodynamics, Kinetic Theory, and Statistical Mechanics
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; entropy; reversibility; applications to various properties of matter; absolute zero and low-temperature phenomena. Distribution functions, transport phenomena, fluctuations, equilibrium between phases, phase changes, the partition function for classical and quantum systems, Bose-Einstein condensation, and the electron gas. Cooperative phenomena including ferromagnetism, the Ising model, and lattice gas. Irreversible processes. Corequisite: 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 173B. Concepts in Condensed Matter Physics
Focus is on simple, archetypical examples. Topics include interaction and correlation, emergent order and symmetry breaking, new states of matter, pattern formation, and nonlinear dynamics in material systems. Prerequisite: introductory solid state or condensed matter physics.

1 unit, not given this year

PHYSICS 190. Independent Study
Preference to sophomores. 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.

1-9 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 204A. Seminar in Theoretical Physics
Topics of recent interest may include cosmology, black hole physics, and strong-weak coupling duality transformations.

3 units, Aut (Laughlin, R)

PHYSICS 204B. Seminar in Theoretical Physics
Topics including quantum computing, Berry phase, and quantum Hall effect.

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 should begin no later than middle of the junior year. Successful completion of an honors thesis leads to graduation with departmental honors. Prerequisites: superior work in Physics as an undergraduate major and approval of the honors adviser.

1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

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 (Kahn, S)

PHYSICS 211. Continuum Mechanics
Elasticity, fluids, turbulence, waves, gas dynamics, shocks, and MHD plasmas. Examples from everyday phenomena, geophysics, and astrophysics.
3 units, Win (Peskin, M)

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 is 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 (Madejski, G)

PHYSICS 220. Classical Electrodynamics
Electrostatics and magnetostatics: conductors and dielectrics, magnetic media, electric and magnetic forces, and energy. Maxwell's equations: electromagnetic waves, Poynting's theorem, electromagnetic properties of matter, dispersion relations, wave guides and cavities, magnetohydrodynamics. Special relativity: Lorentz transformations, covariant, equations of electrodynamics and mechanics, Lagrangian formulation, Noether's theorem and conservation laws. Radiation: dipole and quadrupole radiation, electromagnetic scattering and diffraction, the optical theorem, Liénard-Wiechert potentials, relativistic Larmor's formula, frequency and angular distribution of radiation, synchrotron radiation. Energy losses in matter: Bohr's formula, Cherenkov radiation, bremsstrahlung and screening effects, transition radiation. Prerequisites: 121, 210, or equivalents; MATH 106 and 132.
3 units, Win (Tantawi, S)

PHYSICS 221. Classical Electrodynamics
Electrostatics and magnetostatics: conductors and dielectrics, magnetic media, electric and magnetic forces, and energy. Maxwell's equations: electromagnetic waves, Poynting's theorem, electromagnetic properties of matter, dispersion relations, wave guides and cavities, magnetohydrodynamics. Special relativity: Lorentz transformations, covariant, equations of electrodynamics and mechanics, Lagrangian formulation, Noether's theorem and conservation laws. Radiation: dipole and quadrupole radiation, electromagnetic scattering and diffraction, the optical theorem, Liénard-Wiechert potentials, relativistic Larmor's formula, frequency and angular distribution of radiation, synchrotron radiation. Energy losses in matter: Bohr's formula, Cherenkov radiation, bremsstrahlung and screening effects, transition radiation. Prerequisites: 121 or equivalent; MATH 106 and 132, or PHYSICS 210 .
3 units, Spr (Tantawi, S)

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 (Dimopoulos, S)

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.
4 units, Win (Dixon, L)

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 (Dixon, L)

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 (Michelson, P)

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 (Michelson, 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 teaching assistants in Physics in the year in which they first teach. Techniques of teaching physics by means of weekly

seminars, simulated teaching situations, observation of other teachers, and evaluation of in-class teaching performance.

1 unit, Aut (Pam, R)

PHYSICS 301. Astrophysics Laboratory
Seminar/lab. Astronomical observational techniques and physical models of astronomical objects. Observational component uses the 24-inch telescope at the Stanford Observatory and ancillary photometric and spectroscopic instrumentation. Emphasis is on spectroscopic and photometric observation of main sequence, post-main sequence, and variable stars. Term project developing observational equipment or software. Limited enrollment. Prerequisite: consent of instructor.

3 units, Spr (Church, S)

PHYSICS 312. Basic Plasma Physics
For the nonspecialist who needs a working knowledge of plasma physics for space science, astrophysics, fusion, or laser applications. Topics: orbit theory, the Boltzmann equation, fluid equations, MHD waves and instabilities, EM waves, the Vlasov theory of ES waves and instabilities including Landau damping and quasilinear theory, the Fokker-Planck equation, and relaxation processes. Advanced topics in resistive instabilities and particle acceleration. Prerequisite: 210 and 220, or consent of instructor.

3 units, Win (Kosovichev, A)

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 multiphoton 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 (Kallosh, R)

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 (Kallosh, R)

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.

3 units, Spr (Wacker, J)

PHYSICS 351. Standard Model of Particle Physics and Beyond
Group theory, symmetries, the standard model of particle physics, gauge hierarchy and the cosmological constant problem as motivations for beyond the standard model, introduction to supersymmetry, technicolor, extra dimension, split SUSY. Corequisite: 230.

3 units, Aut (Dimopoulos, S)

PHYSICS 352. Neutrino Physics
Neutrino masses and mixing. Kinematics tests for neutrino masses. Neutrino interactions, the number of light neutrino species. Solar and atmospheric neutrino anomalies. Artificial neutrino sources: reactors and particle accelerators. Majorana and Dirac neutrinos. Double-beta decay. Neutrinos in supernovae. Relic neutrinos. Neutrino telescopes. (Vogel)

3 units, not given this year

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 (Romani, R)

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 (Romani, 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: 210, 211, 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
Early universe cosmology. Topics at the interface between cosmology and gravity, particle theory, and speculative theories of physics at the Planck scale such as string theory. Inflationary cosmology and generation of density pertubations, models of baryogenesis, big bang nucleosynthesis, and speculations about the Universe at the Planck scale. Experiments in the near future that may extend or revise current notions.

3 units, Win (Silverstein, E)

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 (Zhang, S)

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.

3 units, alternate years, not given this year

PHYSICS 373. Condensed Matter Theory II
Superfluidity and superconductivity. Quantum magnetism. Prerequisite: 372.
3 units, 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. (Kivelson)
3 units, Win (Laughlin, R)

PHYSICS 450. PARTICLE PHYSICS
General properties of proton-proton collisions at 14 TeV. Capabilities of the LHC experiments. QCD predictions for hard-scattering reactions: parton distributions, radiative corrections, jets, parton shower. Methods for computing multijet cross sections. Properties of W, Z, top quarks, and Higgs bosons at the LHC. Methods for discovering new heavy particles. May be repeated for credit. Prerequisites: 262, 330, 331, and 332.
3 units, Aut (Peskin, M)

PHYSICS 451. Physics Beyond the Standard Model
Naturalness and the hierarchy problem. Technicolor and extended technicolor. The supersymmetric standard model, supersymmetric unification, and dark matter candidates. Large extra dimensions and TeV scale gravity. The cosmological constant problem, Weinberg's solution, and the landscape. Split supersymetry. May be repeated for credit. Prerequisite: 330.
3 units, Win (Dimopoulos, S)

PHYSICS 452. Supersymmetry, Supergravity, and Cosmology
Issues in supersymmetry and supergravity related to cosmology. The current status of dark energy in supersymmetric theories. Available cosmological data on the early universe and possible supergravity or string theory models explaining the data. A tension between the light gravitino and known mechanisms of moduli stabilization in string cosmology. Future data in cosmology and from the LHC as tests of fundamental physics. May be repeated for credit. Prerequisites: 262, 330, 331, and 332.
3 units, Spr (Kallosh, R)

PHYSICS 463. Special Topics in Astrophysics: Theoretical Cosmology
Content varies depending on participant interest. This year, topics include: large-scale structure formation, the formation and structure of dark matter halos, and N-body simulations; alternative dark matter models; galaxy clustering, the halo model, and halo occupation statistics; galaxy formation models and galaxy evolution; and constraints on cosmological parameters and galaxy formation from large surveys.
3 units, alternate years, not given this year

PHYSICS 475. Advanced Topics in Condensed Matter Physics
Current literature and advanced topics. Journal club format. Content varies depending on interests of participants. May be repeated for credit. Recommended: APPPHYS 272, 273, or equivalents.
1-3 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)

POLITICAL SCIENCE (POLISCI) COURSES

For information on undergraduate and graduate programs in the Department of Political Science, see the "Political Science" section of this bulletin.

UNDERGRADUATE COURSES IN POLITICAL SCIENCE

Courses numbered below 100 are introductory. Courses numbered from 100-199 are intermediate undergraduate lecture courses. Courses numbered 200-299 are advanced undergrduate seminar courses.

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), Spr (Krasner, S)

POLISCI 2. Introduction to American National Government and Politics
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 3. Introduction to Political Philosophy
(Same as ETHICSOC 30, PHIL 30, PUBLPOL 103A.) State authority, justice, liberty, and equality through major works in political philosophy. Topics include human nature and citizenship, the obligation to obey the law, democracy and economic inequality, equality of opportunity and affirmative action, religion, and politics. GER:DB-Hum, DB-Hum, EC-EthicReas
5 units, Spr (Hussain, N)

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, Aut (Diaz-Cayeros, A)

POLISCI 12N. Democracy and Inequality in Latin America
Stanford Introductory Seminar. Preference to freshmen. The relationship between inequality, attributable to factors such as education, assets, land tenure and family structure, and the spread of democracy. The role of colonial institutions founded on the extraction of mineral resources and plantation labor relations; the deficit in political institutions that often led to the exclusion of the poor; the lack of rule of law and enforcement of property rights; the slow expansion of educational systems; the links between enfranchisement and literacy requirements; and the role of military coups and the frequent interruption of democratic politics.
5 units, Spr (Diaz-Cayeros, A)

POLISCI 13N. 2008 Presidential Election
Stanford Introductory Seminar. Preference to freshmen. Analytical framework for understanding the U.S. presidential election campaign. Focus is on historical election results, survey data, and experimental data. Concepts from political science, such as party identification and the spatial voting model, and statistics, such as sampling error and survey bias. GER:DB-SocSci
5 units, Aut (Jackman, S)

POLISCI 16N. Politics of Economic Development
Stanford Introductory Seminar. Preference to freshmen. Why are some countries rich and others poor? What explains the policies that governments adopt, and how do those policies affect economic performance? Readings from political science and economics about Latin America and other regions. GER:DB-SocSci
5 units, Win (Tomz, M)

POLISCI 41Q. Building Democracy after Conflict: Iraq in Comparative Perspective
Stanford Introductory Seminar. Preference to sophomores. Problems of post-conflict situations, the conditions for building democracy and how they relate to post-conflict situations, and historical experiences such as Germany and Japan. Iraq as a principal case study.
5 units, Win (Diamond, L)

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, Aut (Karl, T)

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, WIM
5 units, Win (Goldstein, J)

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, 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, Win (Goldstein, J)

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
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 111D. 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 112K. Korea and East Asian International Relations
Analytical perspectives on the sources of stability and conflict in East Asia, and empirical evidence gathered between the 19th-century clash of civilizations up to the present. Topics include U.S. strategy in East Asia, the impact of the rise of China on regional security, nuclear proliferation, territorial disputes, nationalism, economic interdependence and regionalism, and the broader global security environment.
5 units, Win (Park, S)

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 (Stoner-Weiss, K; McFaul, M)

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 (Blacker, C; Crenshaw, 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, Spr (Holloway, D)

POLISCI 117. Political Economy of East Asia
(Formerly 211.) 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 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. Parties, Voting, the Media, and Elections
The electoral process in the U.S. and patterns of voting behavior. Topics include the causes and structure of partisan identity, public opinion, the decision over whether to vote, and candidate preference among the electorate. Materials on campaigns, candidates, and research on determinants of outcome. The function of the electoral system as a whole and proposals for reform. GER:DB-SocSci
5 units, Aut (Segura, G)

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, WIM
5 units, Spr (Rutten, A)

POLISCI 121. Urban Politics
(Same as SOC 149X, SOC 249X, 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, not given this year

POLISCI 122. Introduction to American Law
(Same as AMSTUD 179, LAWGEN 106.) 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.) 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. GER:DB-SocSci
5 units, Spr (Frisby, T)

POLISCI 124R. Judicial Politics and Constitutional Law: The Federal System
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: 2 or equivalent, and sophomore standing. WIM GER:DB-SocSci, WIM
5 units, Aut (Rutten, A)

POLISCI 124S. Judicial Politics and Constitutional Law: Civil Liberties
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, Win (Rutten, A)

POLISCI 125V. Minority Representation and the Voting Rights Act
Focus is on whether and how racial and ethnic minorities including African Americans, Asian Americans, and Latinos are able to organize and press their demands on the political system. Topics include the political behavior of minority citizens, the strength and effect of these groups at the polls, the theory and practice of group formation among minorities, the responsiveness of elected officials, and the constitutional obstacles and issues that shape these phenomena.
5 units, Win (Segura, G)

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 130C. History of Political Thought III: Freedom, Reason, and Power
(Same as POLISCI 330C.) Classic works in political theory since the American and French revolutions. Readings include Kant, Hegel, Marx, Nietzsche, and Dewey. GER:DB-Hum
5 units, Spr (Stone, P)

POLISCI 133. Ethics and Politics of Public Service
(Same as ETHICSOC 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, given next year

POLISCI 134. Democracy and the Communication of Consent
(Same as COMM 136, 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 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, POLISCI 336.) Recent work in political theory on the ethics of international relations. Topics include human rights, global economic justice, and the problem of global poverty.
5 units, Spr (Staff)

POLISCI 136S. Justice
(Same as ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, PUBLPOL 207.) 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, Aut (Reich, R; Steyer, J)

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, Spr (Diaz-Cayeros, A)

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
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 141. The Global Politics of Human Rights
The global development and changing nature of human rights and the rise of an international human rights movement. Conflicts between national sovereignty and rights, and among types of rights. Case studies include genocide in Rwanda, holding torturers accountable in Chile and El Salvador, factory workers versus Nike, and the rights of women in S. Africa. GER:DB-SocSci

5 units, Win (Karl, T)

POLISCI 142. Politics of Western Europe
Major challenges to European states since WWII. Topics include: the ramification of the differences in Western European political systems; the explanations and consequences of the emergence of the EU; and how European states have reacted to immigration. Theories in comparative politics and political experiences in UK, France, Germany, and Italy. GER:DB-SocSci, EC-GlobalCom

5 units, Win (Kuo, A)

POLISCI 144T. Democracies and Dictatorships
Social scientific findings and debates; cross-sectional approach. What accounts for the emergence of democracy; under what conditions are democracies stable; why are so many developing countries ruled by dictators; why do rulers who destroy their own societies survive for so long; and what accounts for the breakdown of autocratic regimes?

5 units, Spr (Magaloni, B)

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 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 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 (Wand, J)

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 (Rivers, D)

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 (Jackman, S)

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, Spr (Jackman, S)

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, Win (Fearon, J)

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, Spr (Rivers, D)

POLISCI 210R. International Conflict: Management and Resolution
(Same as IPS 250, 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.

5 units, Win (Weiner, A; Holloway, D)

POLISCI 214. The Politics of Nuclear Proliferation
(Same as POLISCI 314. Graduate students register for 314.) The origins and effects of the spread of nuclear weapons at international and domestic levels. The role of faulty intelligence, clandestine proliferation networks, and nuclear assistance from third parties on proliferators' programs. Case studies of relevant programs, including Iran and North Korea.

5 units, Win (Montgomery, A)

POLISCI 215. Explaining Ethnic Violence
What is ethnic violence and why does it occur? Should elite machinations, the psychology of crowds, or historical hatreds be blamed? Case studies and theoretical work on the sources and nature of ethnic violence. GER:DB-SocSci

5 units, Aut (Fearon, J)

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, Aut (Holloway, D)

POLISCI 217. International Organizations
(Same as POLISCI 317. Graduate students register for 317.) The role of international organizations in interstate cooperation. Theoretical approaches and applications. The UN, International Monetary Fund,

World Bank, World Trade Organization, and regional and supranational organizations.

5 units, Spr (Lipscy, P)

POLISCI 218. 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. GER:DB-SocSci

5 units, Aut (Milani, A)

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 221. Tolerance and Democracy
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, Win (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 222R. Tolerance and Prejudice
Focus is on the contemporary strain in U.S. and W. European liberal democratic politics over accommodation of racial, ethnic, and religious diversity and the major threads of current political discourse including pluralism, diversity, prejudice, multiculturalism, and tolerance. GER:DB-SocSci

5 units, not given this year

POLISCI 222S. Topics in Constitutional History
(Same as 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, Spr (Rakove, J)

POLISCI 223S. The Imperial Temptation: U.S. Foreign Policy in a Unipolar World
How the collapse of the Soviet Union liberated the U.S. from the constraints of bipolarity. How current policy fits into earlier traditions such as Wilsonianism or realism. Normative questions; what is America's proper role in the world? Prerequisite: senior standing. GER:DB-SocSci

5 units, Aut (Joffe, J)

POLISCI 227R. Polarized Politics and Special Interest Groups
The influence of special interest groups on electoral competition and policy outcomes in the U.S., and the increasing partisan polarization among elites. How money spent by special interest groups affects the types of candidates who are elected, the agendas of the parties, and the votes of Congressmen. GER:DB-SocSci

5 units, Spr (Wand, J)

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, HUMNTIES 321, 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

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 235. Politics and Religion
Theories about the proper relationship between church and state. Court cases and policy debates.

5 units, Win (Stone, P)

POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector
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, not given this year

POLISCI 237. Models of Democracy
(Same as CLASSHIS 137, CLASSHIS 237, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

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 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 (McFaul, M)

POLISCI 242. Political Economy of Oil and Other Resources
Political and economic determinants of oil and resource policies in developing countries, and their impact on world markets. Interaction between states and extractive industries, challenges of resource wealth management, and causal links between resource dependency and institutions. Is there a resource curse? Do mineral rents hinder democracy and development? Why is resource nationalism on the rise again? Why are there such high rents in oil extraction? Limited enrollment. Prerequisite: senior standing.

5 units, Spr (Monaldi Marturet, F)

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, Aut (Karl, T)

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 247R. Politics and Economics in Democracies
Comparative political economy. Why do some countries have larger welfare states than others? Why do some countries provide collective goods more effectively than others? Prerequisite: senior standing. WIM

5 units, Spr (Staff)

POLISCI 247V. Elections and Redistribution

5 units, Spr (Magaloni, B)

POLISCI 248. Mexican Politics
Why did Mexico fail to eliminate poverty and destitution despite resources channeled to that end and a rhetoric of social justice inherited from the Revolution? The durability of the political regime, the peculiar characteristics of the Mexican process of democratization, and the regime's incentives to redress ancestral problems of inequality and destitution. Emphasis is on crafting research projects on the political economy of Mexican development, and hypothesis testing with empirical data. GER:DB-SocSci, EC-GlobalCom

5 units, Aut (Diaz-Cayeros, A)

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 299A. Senior Project
Students conduct independent research work towards a senior honors thesis. See "Honors Program" above.

1-5 units, Aut (Staff)

POLISCI 299B. Senior Project
Students conduct independent research work towards a senior honors thesis. See "Honors Program" above.

1-5 units, Win (Staff)

POLISCI 299C. Senior Project
Students conduct independent research work towards a senior honors thesis. See "Honors Program" above.

1-5 units, Spr (Staff)

POLISCI 299Q. Junior Research Seminar
Required of students interested in writing a senior honors thesis. Focus is on finding a manageable topic and an adviser.

2 units, Aut (Rutten, A), Win (Rutten, A), Spr (Rutten, A)

POLISCI 299R. Senior Research Seminar
Required of students writing honors theses. Focus is on acquiring research skills and developing an appropriate research design. WIM WIM

3 units, Aut (Rutten, A)

POLISCI 299S. Senior Honors Tutorial
Required of students writing honors theses. Focus is on solving problems in writing a thesis such as keeping on schedule and rewriting drafts. Students work with other honors students and graduate student tutors.

2 units, Win (Rutten, A)

GRADUATE COURSES IN POLITICAL SCIENCE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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, Win (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, Aut (Tomz, M)

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 (Goldstein, J)

POLISCI 310R. International Conflict: Management and Resolution
(Same as IPS 250, POLISCI 210R. 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.

5 units, Win (Weiner, A; Holloway, D)

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.

1-5 units, Aut (Goldstein, J; Tomz, M)

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.

1-5 units, Win (Schultz, K; Sagan, S)

POLISCI 311C. Workshop in International Relations
Organized around presentation of research by students and outside scholars. May be repeated for credit.

1-5 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; Stedman, S)

POLISCI 314. The Politics of Nuclear Proliferation
(Same as POLISCI 214. Graduate students register for 314.) The origins and effects of the spread of nuclear weapons at international and domestic levels. The role of faulty intelligence, clandestine proliferation networks, and nuclear assistance from third parties on proliferators' programs. Case studies of relevant programs, including Iran and North Korea.

5 units, Win (Montgomery, A)

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 (Stoner-Weiss, K; McFaul, M)

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, Aut (Holloway, D)

POLISCI 317. International Organizations
(Same as POLISCI 217. Graduate students register for 317.) The role of international organizations in interstate cooperation. Theoretical approaches and applications. The UN, International Monetary Fund, World Bank, World Trade Organization, and regional and supranational organizations.

5 units, Spr (Lipscy, P)

POLISCI 319. Directed Reading in International Relations
May be repeated for credit.

1-10 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

POLISCI 323R. The Press and the Political Process
(Same as COMM 160, COMM 260.) The role of mass media and other channels of communication in political and electoral processes.

4-5 units, Win (Iyengar, S)

POLISCI 323S. Analysis of Political Campaigns
(Same as COMM 162, COMM 262.) Seminar. The evolution of American political campaigns, and the replacement of the political party by the mass media as intermediary between candidates and voters. Academic literature on media strategies, the relationship between candidates and the press, the effects of campaigns on voter behavior, and inconsistencies between media campaigns and democratic norms. Do media-based campaigns enable voters to live up to their civic responsibility? Has the need for well-financed campaigns increased the influence of elites over nominations? Have citizens become disengaged?

4-5 units, Aut (Iyengar, S)

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 325. Seminar in Law and Politics
Normative and positive literature concerning the relation of law and politics. Literature in political science and political aspects of judicial decision making. Topics include classic questions regarding judicial review of legislation and its ramifying jurisprudential issues.

3-5 units, Win (Ferejohn, J)

POLISCI 326. Race and Racism in American Politics
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 327. Minority Behavior and Representation
Politics of minorities in the U.S. Topics include: historic and contemporary struggles of Latinos, African Americans, and gays and lesbians for political power and social acceptance; group-level public opinion and electoral behavior; scholarship on group influence in the policy making process and policy issues of importance; and the jurisprudence shaping minority political access and civil rights.

5 units, Win (Segura, G)

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, HUMNTIES 321, 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.

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 330C. History of Political Thought III: Freedom, Reason, and Power
(Same as POLISCI 130C.) Classic works in political theory since the American and French revolutions. Readings include Kant, Hegel, Marx, Nietzsche, and Dewey.

5 units, Spr (Stone, P)

POLISCI 331. High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests
(Same as CLASSHIS 332.) Normative political theory combined with positive political theory to better explain how major texts may have responded to and influenced changes in formal and informal institutions. Emphasis is on historical periods in which catastrophic institutional failure was a recent memory or a realistic possibility. Case studies include Greek city-states in the classical periodand the northern Atlantic community of the 17th and 18th centuries including upheavals in England and the American Revolutionary era.

4-5 units, Win (Ober, J; Weingast, B)

POLISCI 331S. Politics and Collective Action
(Same as IPS 206A, PUBLPOL 204A.) 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. Applicable to collective action problems in any realm, but focus is on practical examples from environmental management.

4 units, Spr (Oleson, K)

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 334. Research Workshop: 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 (Reich, R; Meverson, D), Win (Reich, R; Meyerson, D), Spr (Reich, R; Meyerson, D)

POLISCI 336. Introduction to Global Justice
(Same as ETHICSOC 136R, INTNLREL 136R, POLISCI 136R.) Recent work in political theory on the ethics of international relations. Topics include human rights, global economic justice, and the problem of global poverty.

5 units, Spr (Staff)

POLISCI 336M. Marx and Weber
(Same as PHIL 336.) How Marx and Weber each developed theories to account for the political problems of unfreedom, inequality, oppression, and bureaucratization; investigated the extent to which such problems could be mitigated or resolved; and believed that social science could contribute to understanding the modern world and efforts to change it. Their works with reference to politics, human agency, social change, and the role of knowledge.

4 units, Spr (Satz, D)

POLISCI 336T. Religion and the Constitution
(Same as PHIL 374D. Same as LAW 569.) Issues of religious toleration in political theory and in American constitutional law. Topics include: whether religion merits special the special

constitutional solicitude provided by the First Amendment's religion clauses; religion as distinct from culture, morality, and philosophy as understood for constitutional purposes; the tensions between ensuring free exercise and avoiding religious establishment; cases for and against free exercise exemptions; and whether the religion clauses can be understood as serving a single fundamental value such as liberty,equality, or neutrality. Readings from political and constitutional theory including Bodin, Locke, Madison, Jefferson, Rawls, Nussbaum, McConnell, Okin, Choper, Hamburger, and constitutional cases.

3-5 units, Win (Cohen, J; Sullivan, K)

POLISCI 337. Models of Democracy
(Same as CLASSHIS 137, CLASSHIS 237, 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, Spr (Fishkin, J; Ober, J; Luskin, R)

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, Aut (Reich, R; Steyer, J)

POLISCI 338E. The Problem of Evil in Literature, Film, and Philosophy
(Same as FRENGEN 265.) Conceptions of evil and its nature and source, distinctions between natural and moral evil, and what belongs to God versus to the human race have undergone transformations reflected in literature and film. Sources include Rousseau's response to the 1755 Lisbon earthquake; Hannah Arendt's interpretation of Auschwitz; Günther Anders' reading of Hiroshima; and current reflections on looming climatic and nuclear disasters. Readings from Rousseau, Kant, Dostoevsky, Arendt, Anders, Jonas, Camus, Ricoeur, Houellebeck, Girard. Films by Lang, Bergman, Losey, Hitchcock.

3-5 units, Spr (Dupuy, J)

POLISCI 338J. Hobbes and Rousseau
(Same as PHIL 338.) On human nature, freedom, equality, and political authority in Hobbes's *Leviathan* and Rousseau's *Discourse on Inequality* and *Social Contract*.

3 units, Aut (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 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 348R. 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; Zhou, X; Oi, J), Win (Walder, A; Zhou, X; Oi, J), Spr (Walder, A; Zhou, X; 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 (Wand, J)

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 (Rivers, D)

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 (Jackman, S)

POLISCI 351A. Foundations of Political Economy
(Same as POLECON 680.) 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 (Hatfield, J)

POLISCI 351B. Economic Analysis of Political Institutions
(Same as POLECON 681.) 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, Spr (Shotts, K)

POLISCI 351C. Testing Models of Governmental Decision Making
(Same as POLECON 682.) Applications of formal models to several stages of decision making in the U.S. national government, with an emphasis on the legislative branch. Topics include strategies of committees, roll call voting, the budget process, policy formation, effects of special rules, congressional-presidential relations, and congressional-agency relations. Prerequisites: POLECON 680/POLISCI 351A and POLECON 681/POLISCI 351B.

4 units, not given this year

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, Win (Fearon, J)

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.

1-5 units, Aut (Wand, J)

POLISCI 353B. Workshop in Statistical Modeling
Continuation of 353A. Prerequisite: 353A.

1-5 units, Win (Wand, J)

POLISCI 353C. Workshop in Statistical Modeling
Continuation of 353A. May be repeated for credit. Prerequisite: 353A.

1-5 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, Spr (Rivers, D)

POLISCI 362. New Economics of Organization
Survey of economic approaches to organization, emphasizing theory and application, with attention to politics.
5 units, Spr (Weingast, B)

POLISCI 364. Theories of Political Institutions
(Same as POLECON 664.) 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, Win (Moe, T)

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.
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 402. Methods of Analysis Program in the Social Sciences (MAPSS) Workshop
(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. May be repeated for credit.
1 unit, Aut (Jackman, S), Win (Jackman, S), Spr (Jackman, S)

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, Win (Weiner, A; Holloway, D; Ross, L)

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, Aut (Goldstein, J; Sykes, A), Win (Goldstein, J; 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 (Wand, 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)

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 (Moe, T)

POLISCI 422. Campaigns, Elections, and Public Opinion
Research seminar. Frontiers in mass political behavior. Sources include data sets from the 2004 election cycle. Prerequisite: 420B or equivalent.
2-5 units, Aut (Fiorina, M; Sniderman, P), Win (Sniderman, P; Fiorina, M), Spr (Sniderman, P; Fiorina, M)

POLISCI 436. Rational Choice
The scope and limits of rational choice theory. Possible topics: explanatory and normative uses of rational choice; self-interest versus altruism; the nature of social norms; incommensurable choices; and bounded rationality.
5 units, Spr (Stone, P)

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 (Magaloni, B)

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 (Jusko, K)

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.
1-5 units, Aut (Rodden, J; Jusko, K), Win (Rodden, J; Jusko, K), Spr (Rodden, J; Jusko, K)

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, given next year

OVERSEAS STUDIES COURSES IN POLITICAL SCIENCE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING POLITICAL SCIENCE COURSES

OSPBEIJ 47. Institutional Change in Reform China
5 units, Aut (Oi, J)

OSPBEIJ 66. Essentials of China's Criminal Justice System
5 units, Aut (Wang, S)

BERLIN POLITICAL SCIENCE COURSES

OSPBER 15. Shifting Alliances? The European Union and the U.S.
4-5 units, Win (Brueckner, U)

OSPBER 115X. The German Economy: Past and Present
4-5 units, Aut (Klein, I)

OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU
4-5 units, Aut (Brueckner, U)

FLORENCE POLITICAL SCIENCE COURSES

OSPFLOR 61. Europe and U.S. Foreign Policy
5 units, Aut (Schultz, K)

OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
5 units, Aut (Morlino, L)

OSPFLOR 97. Human Rights, Justice and Terrorism: Is the World Community Prepared to Prevent a Catastrophe?
4 units, Spr (Vierucci, L)

OSPFLOR 106V. Italy: From Agrarian to Postindustrial Society
4 units, Aut (Mammarella, G)

KYOTO POLITICAL SCIENCE COURSES

OSPKYOTO 24. Japan in Contemporary International Affairs
5 units, Spr (Horvat, A)

OSPKYOTO 215X. The Political Economy of Japan
4-5 units, Spr (Hayashi, T)

MOSCOW POLITICAL SCIENCE COURSES

OSPMOSC 72. Space, Politics, and Modernity in Russia
5 units, Aut (Medvedev, S)

OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration
5 units, Aut (Bratersky, M; Kortunov, S)

OXFORD POLITICAL SCIENCE COURSES

OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics
4-5 units, Win (McMahon, R)

OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective
4-5 units, Spr (McMahon, R)

OSPOXFRD 35. Modern UK and European Government and Politics
4-5 units, Aut (Cappocia, G)

OSPOXFRD 62. Heretics to Headscarves
5 units, Win (Rakove, J)

OSPOXFRD 63. Locke and his Legacy
5 units, Win (Rakove, J)

PARIS POLITICAL SCIENCE COURSES

OSPPARIS 57. Human Rights in Comparative Perspective
4-5 units, Spr (Boussaguet, L)

OSPPARIS 122X. Challenges of Integration in the European Union
4-5 units, Spr (Strudel, S)

OSPPARIS 211X. Political Attitudes and Behavior in Contemporary France
4-5 units, Aut (Muxel, A; Strudel, S)

SANTIAGO POLITICAL SCIENCE COURSES

OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century
5 units, Spr (Correa, G)

OSPSANTG 129X. Latin America in the International System
4-5 units, Win (Fuentes, C)

OSPSANTG 221X. Political Transition and Democratic Consolidation: Chile in Comparative Perspective
5 units, Aut (Micco, S)

PORTUGUESE LANGUAGE (PORTLANG) COURSES

Because the Portuguese Language Program is in the process of instituting a formal placement test, students registering for the first time in a first- or second-year course must see the coordinator for proper placement if they have had any prior training in Portuguese. Certain Portuguese classes count towards a major in Spanish, and all count for a minor in Portuguese. Consult the Department of Spanish and Portuguese or http://span-port.stanford.edu for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN PORTUGUESE LANGUAGE

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 (Wiedemann, L)

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.
3-5 units, Aut (Staff), Win (Wiedemann, L), Spr (Staff)

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
For students with two years of formal 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 (Wiedemann, L), Win (Staff), 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 (Staff), Win (Staff), Spr (Staff)

PORTLANG 12A. Accelerated Second-Year Portuguese, Part 2
Continuation of 11A. Prerequisite: 11A, equivalent, or consent of instructor.
3-5 units, Aut (Staff), Win (Staff), Spr (Staff)

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.
3-4 units, Spr (Wiedemann, L)

PORTLANG 99. Language Specials
Prerequisite: consent of instructor.
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 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. Preference to sophomores. Introduction to the history, culture, politics, society, and literature of Brazil through films and readings. How the Brazilian film industry reflects its ethnically mixed culture. Forces that have shaped the multicultural reality of modern Brazil and the images projected by the country. In English.
3-4 units, Aut (Wiedemann, L)

GRADUATE COURSES IN PORTUGUESE LANGUAGE

For graduate students only.

PORTLANG 1G. Accelerated First-Year Portuguese, Part 1
For GSB students with two years of formal study of a Romance language, preferably Spanish. Goal is to use socially and culturally appropriate forms in conversations, establishing relationships, providing and obtaining information, and expressing feelings, emotions, and opinions. Written and spoken language; social and cultural influences; and how to present information, concepts, and ideas on academic topics. Limited enrollment.
4 units, Win (Wiedemann, L)

PORTLANG 2G. Accelerated First-Year Portuguese, Part 2
Continuation of 1G. GSB students only. Limited enrollment.
4 units, Spr (Wiedemann, L)

PORTLANG 297. Directed Reading
Prerequisite: consent of instructor.
1-4 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTLANG 394. Graduate Studies in Portuguese Conversation
Prerequisite: consent of instructor.
1-3 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTLANG 395. Graduate Studies in Portuguese
Prerequisite: consent of instructor.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

PORTUGUESE LITERATURE (PORTLIT) COURSES

These courses typically require knowledge of Portuguese. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on the undergraduate minor in Portuguese, see the "Spanish and Portuguese" section of this bulletin. For courses in Portuguese language instruction, see "Portuguese Language" courses section of this bulletin.

UNDERGRADUATE COURSES IN PORTUGUESE LITERATURE

PORTLIT 157. Introduction to Medieval and Early Modern Iberian Literatures
(Same as SPANLIT 157.) 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)

GRADUATE COURSES IN PORTUGUESE LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PORTLIT 299. Individual Work
Open to department undergraduates or graduate students by consent of professor. May be repeated for credit.
1-12 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

PORTLIT 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)

PSYCHIATRY (PSYC) COURSES

The following courses are available to undergraduates. For graduate and Medical School offerings, see http://medcatalog.stanford.edu.

UNDERGRADUATE COURSES IN PSYCHIATRY

PSYC 76Q. Temperament and Creativity in Mood Disorders
Stanford Introductory Seminar. Preference to sophomores. Western cultural notions of mad geniuses and artistic temperaments. How many individuals who suffer from depression, bipolar disorder, and related problems are nonetheless productively creative. Current psychological and neurobiological research, and assessment of mood, temperament, and creativity. Emphasis is on written and oral communications and multimedia presentations. Write 2. Prerequisite: PWR 1.
4 units, Win (Ketter, T)

PSYC 78Q. Mental Health in Collegiate Athletes
Stanford Introductory Seminar. Developmental, social, and performance issues in collegiate sports. Topics include transition to Stanford, time management, coping with injuries.
3 units, Win (Steiner, H; McCurdy, M)

PSYC 81Q. Fate of Orphans and Vulnerable Children in Sub Saharan Africa: The HIV/AIDS Pandemic
Stanford Introductory Seminar. The complicated forces,shaped by geopolitcal history and current events, that frame all social programs, the care of orphans in the context of the AIDS pandemic in particular; history of the care of orphans; developmental effects of deprivation of care and nurturing. Guest speakers.
3 units, Win (Solvason, H; Reicherter, D)

PSYC 111Q. Madness and the Womb: Medical and Artistic Approaches to Mental Illness in Women Through the Ages
Stanford Introductory Seminar. Historical and current concepts of mental illness in women. Premenstrual dysphoric disorder (PMS), postpartum depression, menopausal mood disorders, and eating disorders. Historical biopsychosocial approach. Readings include women's diaries and advice books, physicians' casebooks, and 19th- and 20th-century medical texts. Guest speakers from art and literature departments. Literary and artistic images, and the social and cultural contexts of these disorders during the last 300 years.
3 units, Aut (Williams, K)

PSYC 135. Sleep and Dreams
(Same as PSYC 235.) Current research on how sleep affects our daily lives. Physiology of non-REM and REM sleep, dreams and dreaming, content, psychophysiological cause, lucid dreaming, sleep need, sleep debt, daytime alertness, and performance; biological clock and circadian rhythms; sleep disorders, insomnia, narcolepsy, sleep apnea, sleepwalking, jet lag, sleeping pills, sleep and mental illness, sleep and memory, and the impact of sleep deprivation and sleep disorders on academic and social life. Multimedia presentations, guest lectures, and projects. GER:DB-NatSci
3 units, Win (Dement, W; Van Rheenen, J)

PSYC 136A. Valuescience: Shedding Illusion to Live Better
(Same as PSYC 236A.) Applying scientific methods and principles to discern and realize value. Readings in history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to scientific and cultural revolutions attending the emergence of valuescience as foundation for an increasing range of human action. Perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; personal and social benefits of doing so.
3 units, Aut (Dement, W)

PSYC 136B. Valuescience: Shedding Illusion to Live Better
(Same as PSYC 236B.) Continuation of 136A/236A. Applying scientific methods and principles to discern and realize value. Readings in history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to scientific and cultural revolutions attending the emergence of valuescience as foundation for an increasing range of human action. Perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; personal and social benefits of doing so.
3 units, Spr (Dement, W)

PSYC 139. Clinical Introduction to Couples and Family Therapy (VAPAHCS)
(Same as PSYC 239.) Introduces family-systems theory as a foundation for the practice of couples and family therapy in psychiatric and medical settings. Students observe couples and families in treatment "live" from behind a one-way mirror or on videotape and participate in post-session discussions. In these discussions with Family Therapy Program staff, students learn basic family interviewing, assessment, and intervention skills. Selected readings provide both a theoretical and practical introduction to couples and family therapy.
1 unit, Spr (Rait, D)

PSYC 195. Special Laboratory Projects
Assist Behavioral Neuroendocrinology Program with data entry, library organization, and study-related projects.
1-3 units, Aut (Rasgon, N), Win (Rasgon, N), Spr (Rasgon, N), Sum (Rasgon, N)

PSYC 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)

PSYCHOLOGY (PSYCH) COURSES

For information on undergraduate and graduate programs in the Department of Psychology, see the "Psychology" section of this bulletin.

UNDERGRADUATE COURSES IN PSYCHOLOGY

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 (Monin, B)

PSYCH 7Q. Language Acquisition
Stanford Introductory Seminar. Preference to sophomores. How do infants learn language so effortlessly? Why is it more difficult to learn a language as an adult? Theories of first and second language development and experimental techniques for reading children's minds.
3 units, Aut (Fernald, A)

PSYCH 8N. Life Span Development
Stanford Introductory Seminar. Preference to freshmen. People continue to change in systematic ways throughout life, but developmental psychology has focused mostly on childhood. Focus is on conceptual models that direct developmental research on adulthood and old age, and the empirical literature concerning developmental changes in cognition, motivation, and emotion. 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 (Thomas, E), Win (Walther, G), Spr (Boik, J), Sum (Staff)

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 16N. Amines and Affect
Stanford Introductory Seminar. Preference to freshmen. How serotonin, dopamine, and norepinephrine influence people's emotional lives. GER:DB-SocSci
3 units, Spr (Knutson, B)

PSYCH 18N. Early Social Cognitive Development
Preference to freshmen. Focus is on the development of attachment and its impact on psychological functioning. GER:DB-SocSci
3 units, not given this year

PSYCH 23N. Aping: Imitation, Control, and the Development of the Human Mind
Stanford Introductory Seminar. Preference to freshmen. The idea that a childhood that prolongs a state of stimulus-bound helplessness beyond that of animals is the price human beings pay for the benefits of shared cognitive structures. How such structures enable social collaboration, language, and the transmission and sharing of knowledge. Sources include psychological data from animals and humans, and recent discoveries in neuroscience.
3 units, Spr (Ramscar, M)

PSYCH 25N. Psychology, Inequality, and the American Dream
Stanford Introductory Seminar. Preference to freshmen. What role do psychological factors play in perpetrating inequality despite legal prohibitions? How can psychologically wise reforms promote equal

opportunity? Topics include school achievement, prejudice and discrimination, social class, and race/ethnicity.

3 units, Aut (Walton, G)

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

(Same as SYMBSYS 50.) 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, Win (McClure, S)

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, Aut (Johnson, S)

PSYCH 60A. Introduction to Developmental Psychology Section

Guided observation of children age 2-6 at Bing Nursery School. Corequisite: 60.

2 units, Aut (Lomangino, A)

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, Spr (Tormala, T)

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, alternate years, not given this year

PSYCH 80. Introduction to Personality Psychology

Current empirical and theoretical approaches to personality. How and why do people differ? Does personality change over time? Can people change their personalities?mWhat 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 95. Introduction to Abnormal Psychology

Theories of and approaches to understanding the phenomenology, etiology, and treatment of psychological disorders among adults and children. Research findings and diagnostic issues. Recommended: PSYCH 1. GER:DB-SocSci, DB-SocSci

3 units, not given this year

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 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

3 units, Win (Rando, T; Carstensen, L)

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 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 119. Psychology and Public Policy

(Same as PUBLPOL 172.) Applications of psychology to public and social policy. Topics include 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. How psychological theory can be used to shape policies and policy making in areas such as environment, education, criminal justice, and health.

5 units, Win (Tormala, T)

PSYCH 119S. The Psychology of Stigma

What obese people, African Americans, people with physical disabilities, lesbians, and Muslims have in common: social stigma. The social and psychological experiences of individuals living with social stigmas. Classic and current theory and research. Topics include: function, nature, and types of stigma; how stigmatized individuals view their identities and cope; mental and cognitive consequences; and interactions between stigmatized and non-stigmatized. Literature employing research methods including neuroimaging and social interaction studies.

3 units, Sum (Jones, V)

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 120S. Temptations and Self Control

(Same as PSYCH 220S.) Why do people do things they come to regret, such as lack of exercise, angry words, overeating, unsafe sex, or dangerous driving? How can they minimize such behaviors? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Emphasis is on real-world applications.

3 units, not given this year

PSYCH 121. Ion Transport and Intracellular Messengers

(Same as PSYCH 228. Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Lab demonstrations and hands-on introduction to techniques such as patch clamping. Recommended: 120 or introductory course in biology or human biology.

1-3 units, Spr (Wine, J)

PSYCH 122S. Introduction to Cognitive and Comparative Neuroscience

Evolutionary and ethological perspective on cognitive neuroscience and the neural systems underlying human thought. Classic research in cognitive neuroscience. How to analyze cutting-edge science. Sources include primary research articles. Topics include: basic neuroanatomy and neuroscientific techniques; perception, memory,

and attention; language, social learning and communication; priniciples of evolution; learning and decision making. Final project. Prerequisites: high school biology or consent of instructor.

3 units, Sum (Yoon, J; Chen, J; Hutchinson, J)

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 (Jordan, A; Chen, F)

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, SYMBSYS 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 (Wasow, T; Roberts, E)

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, Win (Shavelson, R)

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 137. Birds to Words: Cognition, Communication, and Language

(Same as HUMBIO 145, PSYCH 239A.) Although the communicative abilities of animals are determined by their genetic endowment, and human communicative skills dwarf those of other species, the relation between language and genetics remains the subject of debate. Is human language genetically specified? Or are human communicative powers just one facet of human cognitive advantage? Focus is on the nature and origins of language, using evidence from studies of animals, children, and adults. GER:DB-SocSci

4 units, Aut (Fernald, A; Ramscar, M)

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, Spr (Walton, G)

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, Spr (Johnson, S)

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, Win (Lomangino, A), Spr (Lomangino, A)

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), Win (Winters, J; Chandra, P), Spr (Winters, J; Chandra, P)

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, Spr (Hard, B)

PSYCH 152. Mexdiation 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 (Massey, T)

PSYCH 155. Introduction to Comparative Studies in Race and Ethnicity

(Same as CSRE 196C, ENGLISH 172D, HISTORY 65, 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, given next 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, Win (Zajonc, R)

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, Win (Gross, J)

PSYCH 163. Interpersonal Basis of Abnormal Behavior
The role of interpersonal problems and processes in producing forms of psychopathology including mild and severe disorders. Conventional empirical methods clarify the origin, nature, and treatment of emotional and personality disorders. Prerequisite: PSYCH 1. GER:DB-SocSci

3 units, Win (Horowitz, L)

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 166. Seminar on Personal and Social Change
Social cognitive approaches to personal and social change. Applications of sociocognitive theory to the modification of psychological dysfunctions in familial, educational, medical, and organizational settings. Ethical and value issues in behavior change.

3 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, Win (Bandura, A)

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 180. Social Psychological Perspectives on Stereotyping and Prejudice
(Same as PSYCH 245.) 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. GER:DB-SocSci

3 units, Spr (Eberhardt, J)

PSYCH 180C. Asian American Sexualities
(Same as ASNAMST 180C, CSRE 180C.) Seminar. Mutual constitution of culture and sexuality among Asian Americans; attitudes, behaviors, taboos, and identity. How masculinity and femininity are portrayed in the media; cultural attitudes toward homosexuality; and sexual politics. Social, political, and psychological implications.

5 units, not given this year

PSYCH 183. Mind, Culture, and Society Labwork
Required of and limited to research assistants in the mind, culture, and society lab. The development of analytical thinking with reference to how social identities such as race, class, gender, and culture affect psychological experiences across domains including education, law, business, and health.

2-3 units, Aut (Eberhardt, J), Win (Eberhardt, J), Spr (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, Win (Monin, B)

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 193. Special Laboratory Research
May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.

1-6 units, Aut (Staff), Win (Staff), 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 197. Advanced Research
Limited to students in senior honors program. Weekly research seminar, independent research project under the supervision of an appropriate faculty member. A detailed proposal is submitted at the end of Autumn Quarter. Research continues during Winter and Spring quarters as 198. A report demonstrating sufficient progress is required at the end of Winter Quarter.

1-4 units, Aut (Eberhardt, J)

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, Win (Eberhardt, J), Spr (Eberhardt, J)

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

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.) Methods of integrating career and personal counseling with clients and counselors from differing backgrounds. Practice with assessment instruments. Case studies of bicultural role conflict. Informal experience in counseling. (PSE)
3 units, not given this year

PSYCH 201. Social Psychology Lecture Series
Required of social psychology graduate students. Guest lecturers from Stanford and other institutions. May be repeated for credit.
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. Computational Neuroimaging
Advanced seminar. For students working with functional magnetic resonance imaging (fMRI). The physiological basis of the signal measured using fMRI. Possibilities for experiment design and interpretation of the signal with respect to other physiological and behavioral measurements. Emphasis is on experimental design, software tools, and pulse sequences for fMRI experiments.
1-3 units, Spr (Wandell, B)

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, alternate years, 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 (Ramscar, M)

PSYCH 206. Cortical Plasticity: Perception and Memory
Seminar. Topics related to cortical plasticity in perceptual and memory systems including neural bases of implicit 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 (Wandell, B)

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 209. The Neural Basis of Cognition: A Parallel Distributed Processing Approach
The neural basis of perception and attention; memory, learning, and semantic knowledge; language and reading; and action selection, planning, and problem solving. Findings from human behavioral experiments, neurophysiology, functional brain imaging, and the effects of brain disorders on performance; computational models that address these findings from the parallel distributed processing point of view which holds 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 occurs primarily through the adjustment of the strengths of the connections between the neurons. Corequisite: 209B.
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.
1-4 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, alternate years, 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)

PSYCH 213. Personality and Psychopathology
Historical trends, theoretical issues, and empirical approaches to the study of individual differences in personality and psychopathology. Topics include: trait approach for describing individual differences; its role in exploring such topics as the importance of the person by situation interaction; and psychometric themes and issues. Individual differences in motivation manifested in attachment styles in childhood and adulthood; stress, coping, health; self and self-regulation; and severe forms of psychopathology. Prerequisite: 207 or consent of instructor.
1-3 units, Spr (Horowitz, L)

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 205B.) 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, Win (Tsai, J)

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, Spr (Johnson, S)

PSYCH 220. Topics in Cognitive Development

Topics change each year. May be repeated for credit. Prerequisite: graduate standing in Psychology or consent of instructor.

1-3 units, Spr (Markman, E)

PSYCH 220S. Temptations and Self Control

(Same as PSYCH 120S.) Why do people do things they come to regret, such as lack of exercise, angry words, overeating, unsafe sex, or dangerous driving? How can they minimize such behaviors? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Emphasis is on real-world applications.

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.) 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. How to identify and formulate tractable research questions.

4 units, Spr (Staff)

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, Aut (McClelland, J; Wagner, A)

PSYCH 227. Seminar in Psycholinguistics

(Same as LINGUIST 247.) May be repeated for credit.

2-4 units, not given this year

PSYCH 228. Ion Transport and Intracellular Messengers

(Same as PSYCH 121. Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Lab demonstrations and hands-on introduction to techniques such as patch clamping. Recommended: 120 or introductory course in biology or human biology.

1-3 units, Spr (Wine, J)

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, Win (Walton, G)

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, Spr (Walton, G)

PSYCH 239A. Birds to Words: Cognition, Communication, and Language

(Same as HUMBIO 145, PSYCH 137.) Although the communicative abilities of animals are determined by their genetic endowment, and human communicative skills dwarf those of other species, the relation between language and genetics remains the subject of debate. Is human language genetically specified? Or are human communicative powers just one facet of human cognitive advantage? Focus is on the nature and origins of language, using evidence from studies of animals, children, and adults.

4 units, Aut (Fernald, A; Ramscar, M)

PSYCH 243. General Development Seminar

May be repeated for credit. Prerequisite: consent of instructors.

1-2 units, Win (Markman, E; Fernald, A; Johnson, S)

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
(Same as PSYCH 180.) 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, Spr (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 (Boroditsky, L; Wagner, A), Win (Boroditsky, L; Wagner, A), Spr (Boroditsky, L; Wagner, A)

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 (Dweck, C; Lepper, M)

PSYCH 250. High-level Vision
Interdisciplinary focus on topics of high level vision from research in psychology, neuroscience and computer science. Theories, ongoing debates in the field, and recent empirical findings. Theories and models of object and face recognition. How is invariant object recognition accomplished? What are the neural mechanisms of object and face recognition? Are faces special? What is the role of experience in shaping object and face representations? Recommended: 30
1-3 units, Spr (Grill-Spector, K)

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, not given this year

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.
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. (Zajonc)
1-3 units, Aut (Zajonc, R), Win (Zajonc, R), Spr (Zajonc, R)

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, Win (Zajonc, R)

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, Spr (Staff)

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, Win (Gross, J)

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, not given this year

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 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 Personality Research
May be repeated for credit. Prerequisite: graduate standing in Psychology. (Gotlib)
1 unit, Aut (Gotlib, I), Win (Gotlib, I), Spr (Gotlib, I)

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 275. Graduate Research
Intermediate-level research undertaken with members of departmental faculty. Prerequisite: consent of instructor.
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 (Monin, B), Spr (Knutson, B)

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, Win (Weiner, A; Holloway, D; Ross, L)

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, Win (Monin, B)

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, Aut (Clark, H), Win (Clark, H), 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 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, Win, Spr (Robertson, C)

PUBLIC POLICY (PUBLPOL) COURSES

For information on undergraduate and graduate programs in Public Policy, see the "Public Policy" section of this bulletin.

UNDERGRADUATE COURSES IN PUBLIC POLICY

PUBLPOL 101. Politics and Public Policy
(Same as POLISCI 123.) 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. GER:DB-SocSci
5 units, Spr (Frisby, T)

PUBLPOL 102. Organizations and Public Policy
Analysis of organizational processes emphasizing organizations that operate in a non-market environment. Prerequisite: ECON 1A. GER:DB-SocSci
5 units, Win (Bendor, J)

PUBLPOL 103A. Introduction to Political Philosophy
(Same as ETHICSOC 30, PHIL 30, POLISCI 3.) State authority, justice, liberty, and equality through major works in political philosophy. Topics include human nature and citizenship, the obligation to obey the law, democracy and economic inequality, equality of opportunity and affirmative action, religion, and politics. GER:DB-Hum, DB-Hum, EC-EthicReas
5 units, Spr (Hussain, N)

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 104. Economic Policy Analysis
(Same as ECON 150.) 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, Spr (Staff)

PUBLPOL 104W. Economic Policy Analysis
(Same as ECON 150W, SIW 123.) Taught in Washington, DC; offered via distance learning to Stanford students on campus. Economics of evaluating and implementing public policies. Focus is

on cost-benefit analysis, regulation, efficiency and equity, externalities, subsidies, public good provision, opportunity costs, the role of economic analysis in policy making, and how political institutions affect policy outcomes. Topics: climate change, telecommunications, defense and homeland security, controversial aspects of cost-benefit-analysis.

5 units, Aut (Wallsten, S)

PUBLPOL 105. Quantitative Methods and Their Applications to Public Policy

Reviews material covered in prerequisites with applications of qualitative independent variable techniques to labor market data. Maximum likelihood estimation and qualitative dependent variable models with an application to voting models. Final papers estimate influence of quantitative and qualitative independent variables on Congressional voting probabilities. Prerequisites: ECON 102A,B. GER:DB-SocSci

5 units, Spr (Rothwell, G)

PUBLPOL 106. Economics of Legal Rules and Institutions

(Same as ECON 154.) 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 117. Econometrics for Public Policy Majors

Descriptive statistics, regression analysis, analysis of variance, heteroskedasticity, serial correlation, errors in variables, and simultaneous equations. Prerequisites: Public Policy major; ECON 50 and 102A.

5 units, not given this year

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 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. Prerequisites: POLISCI 2. GER:DB-SocSci

5 units, Spr (Greenberg, J)

PUBLPOL 126. Networking with Government to Achieve Social Change

(Same as GSBGEN 593.) The role of government in the change process, the values and mindsets of government leaders, assets and resources that public agencies bring to the change initiative, limits of government action, and leadership strategies for promoting collaboration between sectors. Guest speakers, case studies, team projects, including a business plans for a social innovation project.

2 units, not given this year

PUBLPOL 130. Path Dependence in Private Action and Public Policy: Decision Making in the Shadow of History

(Same as ECON 151.) The historically contingent development of economic, social, and political behaviors at micro and macro levels. History's role in individual and organizational decision making. When can extraneous events have persisting effects upon public institutions, private organizations, and government agencies? Science and technology policy making; precedent-based judicial and administrative proceedings; and institutional reforms and regulatory initiatives illustrate positive feedback dynamics; self-organization and emergent properties in complex systems; conditions of lock-in to and escapes from sub-optimal equilibria in economic and social arrangements. Recommended: ECON 51.

3-5 units, Win (David, P)

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 may 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 156. Health Care Policy and Reform

Competing health care reform proposals at the state and local levels. Focus is on California including proposals for expanding coverage for children, a single payer system, employer and individual mandates. Recent proposals in other states including Massachusetts, Maine, and Vermont; their relation to national efforts. Attention to local reform efforts, including in San Francisco. Prospects for future policy.

5 units, Spr (Nation, J)

PUBLPOL 164. Comparative Public Policy

Problems, answers, underlying political philosophies, and impacts of public policy choices in areas such as aging populations, health care costs, illegal immigration, terrorism, pollution, and competition from low-cost countries. Focus is on N. America and Europe. (Crombez) GER:DB-SocSci

3 units, not given this year

PUBLPOL 168. Global Organizations: Managing Diversity

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. Topics include 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. How psychological theory can be used to shape policies and policy making in areas such as environment, education, criminal justice, and health.

5 units, Win (Tormala, T)

PUBLPOL 176. Urban Economics

(Same as URBANST 173.) Application of the principles of economic analysis to urban issues and policy, including urban land use, housing, transportation, economic development, and the financing of public services. Fundamentals of microeconomic theory.

4-5 units, Aut (Reilly, M)

PUBLPOL 180. Social Innovation

The mechanisms and features of social innovation defined as the process of inventing, securing support for, and implementing novel solutions to social needs and problems. Focus is on the social, economic, technical, and organizational mechanisms underlying innovations. Sources include social science theory and research, and insights from the practical world. GER:DB-SocSci

4 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 history and industry; foundation models and infrastructure; philanthropic strategy and grantmaking; accountability and board governance; global and corporate philanthropy; and public policy engagement. Readings: business school cases and industry articles. Guest speakers include individual donors and foundation presidents. Final project: students evaluate grant proposals and make funding recommendations. Enrollment limited to 15. GER:DB-Hum

2 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, Win (Kochar, A)

PUBLPOL 187. The Unintended Consequences of Technology
How human inventions impact other inventions, society, the individual, and history. Unintended social consequences of technologies such as railroads, telegraphs, telephones, automobiles, and jet travel. Group projects focus on the design of a national survey to gauge the social effects of Internet technology (IT) on how people spend their time, including the impact of Internet use on non-work activities such as sleep and time spent with friends and family. Practical and innovative techniques in statistical analysis. GER:DB-SocSci

3-4 units, not given this year

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 199B. Senior Honors Seminar
Research, statistical, and writing support for Public Policy honors students.

1 unit, not given this year

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 (Lovenheim, M)

PUBLPOL 200B. Senior Seminar: Conducting Policy Analysis for Local Agencies
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. GER:DB-SocSci

5 units, Win (Durbin, B)

PUBLPOL 200C. 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, Spr (Durbin, B)

GRADUATE COURSES IN PUBLIC POLICY

Primarily for graduate students; undergraduates may enroll with consent of instructor.

PUBLPOL 201A. 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.

4 units, Aut (Bulow, J)

PUBLPOL 201B. Cost-Benefit Analysis and Evaluation
(Same as IPS 204B.) Ex ante and ex post evaluation of projects and policies, value of life calculations, and welfare evaluation of public and private decisions. Welfare measures; tradeoffs between efficiency and equity. Second best. Behavioral economics: psychological mechanisms behind static choice, intertemporal choice, choice under risk and uncertainty, choice in social situations, and hedonics. Statistical decision theory. Use of incentives in implementing policies. 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.

4 units, Spr (Kessler, D)

PUBLPOL 202A. Introduction to Law
Differences between common and civil law systems; judge-made law and judicial process; courts and litigation; legislation and its interpretation; administrative law and regulation. Separation of powers and federalism; constitutional law and civil liberties; criminal justice; empirical studies of the legal profession and legal behavior; social change and its impact on the legal order; law and economic development.

2 units, Aut (Friedman, L)

PUBLPOL 202B. Economic Analysis of Law
(Same as LAW 277.) How legal rules and institutions can correct market failures.The economic function of contrasts; role of legal remedies to resolve disputes when contracts fail. The choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors such as regulatory authorities. Economics of litigation; how private incentives to bring lawsuits differ from the social value of litigation. Economic motives to commit crimes; optimal governmental response to crime. Prerequisites: intermediate-level microeconomics; some calculus.

4 units, Win (Polinsky, M)

PUBLPOL 203A. Principles of Research Design and Analysis: Methods
(Same as IPS 205A.) 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.

2 units, Aut (Hensler, D)

PUBLPOL 203B. Principles of Research Design and Analysis: Tools
(Same as IPS 205B, 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 203C. Foundations of Statistical Inference
(Same as IPS 205C, 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 via computer exercises using statistical packages; how to analyze empirical studies, conduct empirical research, and cross-examine or work with statistical experts.

2 units, Aut (Strnad, J)

PUBLPOL 204A. 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. Applicable to collective action problems in any realm, but focus is on practical examples from environmental management.
4 units, Spr (Oleson, K)

PUBLPOL 204B. Organizations
(Same as IPS 206B.) Policy reform and organizational resistance. Organizations include government and other bureaucracies such as not-for-profit schools, universities, hospitals, international organizations, political parties, and agencies. Hubris and policy making, including pathologies of decision making and planning, abuse of intelligence, biased information, overselling to publics, lack of knowledge about context, and unintended consequences.
4 units, Spr (Stedman, S; Eden, L)

PUBLPOL 205A. 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. Support theory. 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 205B. 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 206. Writing and Rhetoric for Policy Audiences
Techniques of effective writing and argument for addressing decision makers, interest groups, and the public. The importance of apparent simplicity; uses and misuses of history and historical analogies; and incentives, cognitive limits, and biases of audiences. Why some arguments become traditional. Sources include historical briefing papers and oral arguments. Students write briefing papers and make oral arguments, individually and in teams. Enrollment limited. Prerequisite: consent of instructor.
4 units, Win (Owen, B; Rosston, G)

PUBLPOL 207. 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.
4-5 units, Aut (Cohen, J)

PUBLPOL 209. 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.
5 units, Aut, Win (Sprague, M; Oleson, K)

PUBLPOL 231. Political Economy of Health Care in the United States
(Same as MGTECON 331, HRP 391.) The economic tools and institutional and legal background to understand how markets for health care products and services work. Moral hazard and adverse selection. Institutional organization of the health care sector. Hospital and physician services markets, integrated delivery systems, managed care, pharmaceutical and medical device industries. Public policy issues in health care, medical ethics, regulation of managed care, patients' bill of rights, regulation of pharmaceuticals, Medicare reform, universal health insurance, and coverage of the uninsured. International perspectives, how other countries' health care systems evolved, and what the U.S. can learn from their experiences.
4 units, Spr (Kessler, D; Bundorf, M)

PUBLPOL 299. 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)

OVERSEAS STUDIES COURSES IN PUBLIC POLICY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING PUBLIC POLICY COURSES

OSPBEIJ 24. China's Economic Development
5 units, Spr (Rozelle, S)

OSPBEIJ 47. Institutional Change in Reform China
5 units, Aut (Oi, J)

FLORENCE PUBLIC POLICY COURSES

OSPFLOR 46. International Monetary Economics
5 units, Spr (Cifarelli, G)

OSPFLOR 61. Europe and U.S. Foreign Policy
5 units, Aut (Schultz, K)

OSPFLOR 61. Europe and U.S. Foreign Policy
5 units, Aut (Schultz, K)

OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union
5 units, Aut (Morlino, L)

OXFORD PUBLIC POLICY COURSES

OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics
4-5 units, Win (McMahon, R)

PARIS PUBLIC POLICY COURSES

OSPPARIS 33. The Economics of Climate Change: Policies in Theory and Practice in the EU and the U.S.
5 units, Spr (de Perthuis, C; Keppler, J; Leguet, B)

OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead
5 units, Aut (Le Cacheux, J; Laurent, E)

OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time
4-5 units, Win (Fessler, J)

SANTIAGO PUBLIC POLICY COURSES

OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies
5 units, Spr (Munoz, O)

OSPSANTG 160X. Latin America in the International Economy
5 units, Win (Staff)

RADIATION ONCOLOGY (RADO) COURSES

For information on graduate programs in Radiation Oncology, see the "Radiation Oncology" section of this bulletin. Course and laboratory instruction in the Department of Radiation Oncology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN RADIATION ONCOLOGY

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 299. Directed Reading in Radiation Oncology
Prerequisite: consent of instructor.
1-18 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

For information on graduate programs in Radiology, see the "Radiology" section of this bulletin.

UNDERGRADUATE COURSES IN RADIOLOGY

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 208. Experimental Nuclear Medicine
Computer applications in medicine, particularly in the use of radioisotopes as tracers. Recommended: some knowledge of physiology and calculus.
2 units, Win (Goris, M)

RAD 220. Imaging 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.) Instruments for imaging molecular and cellular events in animals and human beings using novel assays. Instrumentation physics, chemistry of molecular imaging probes, and applications to preclinical models and clinical disease management.
4 units, Aut (Gambhir, S; Rao, J)

RAD 222B. Multimodality Molecular Imaging in Living Subjects II
(Same as BIOE 222B.) In vivo imaging techniques and applications to preclinical models and clinical disease management. Focus on cancer research, neurobiology, cardiovascular and musculoskeletal diseases.
2 units, Win (Gambhir, S; 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. Recommended: neuroscience.
3 units, not given this year

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 299. Directed Reading in Radiology
Prerequisite: consent of instructor.
1-18 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

For information on undergraduate and graduate programs in the Department of Religious Studies, see the "Religious Studies" section of this bulletin.

UNDERGRADUATE COURSES IN RELIGIOUS STUDIES

RELIGST 2N. Theories of Ethics in Classical Islamic Thought
Stanford Introductory Seminar. Preference to freshmen. Premodern Islamic theories of ethics. Homegrown ethical theories and adaptations of Greek thought. How various groups molded their ethical theories to fit their respective theological outlooks, including dialectic theologians, the Greek-inspired philosophers, and the mystics.
4 units, Spr (Sadeghi, B)

RELIGST 3N. Jesus the Jew and the Origins of Christianity
Stanford Introductory Seminar. Preference to freshmen. 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.

4 units, Aut (Sheehan, T)

RELIGST 7N. The Divine Good: Secular Ethics and Its Discontents

Stanford Introductory Seminar. Preference to freshmen. What is the good and how does it orient human choice and activity? Is it natural to human beings, or in some way transcendent? How do people come to know it? Why do people often fail to do the good they know? What human capacities and dispositions enable its enactment or attainment? What resources does religion offer for its reparation? Classical and modern readings in moral theory emphasizing the difference that religious aspiration makes for moral reflection. GER:DB-Hum, EC-EthicReas

4 units, Win (Sockness, B)

RELIGST 9N. Transgression and Transcendence: Exploring Tantric Buddhism

Stanford Introductory Seminar. Preference to freshmen. Vajrayana or Tantric Buddhism, its historical development and primary doctrines, ritual practices, and iconography. Focus is on their transgressive aspects, broader Indian background, and contemporary representations.

4 units, Aut (Harrison, P)

RELIGST 11. Religious Classics of Asia: India's Ramayana Epic

The Ramayana as one of the most important religious and cultural texts of India. Its heroes, Rama and Sita, as incarnations of the supreme God and Goddess and models for ideal manhood and womanhood. Textual and performative versions including Valmiki's 2,000-year-old Sanskrit poem, medieval vernacular versions, rural women's folk songs, and the TV serial of 1988-89. Ramayana traditions through the lenses of religion, literature, performance, popular culture, gender, and politics. GER:DB-Hum, EC-GlobalCom

3 units, not given this year

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. Introduction to 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, Win (Harrison, P)

RELIGST 18. Introduction to Zen Buddhism

Classical Zen thought in China, and its background, origins, and development. GER:DB-Hum, EC-GlobalCom

4 units, Aut (Bielefeldt, C)

RELIGST 20. Introduction to the Zoroastrian Religion

The origins of Zoroastrianism, its role in the Iranian empires, and its relation to Judaism, Christianity, Manichaeism, and Islam, and its later forms and function in Iran, India, and its diaspora. The impact of the religion on European literati such as Voltaire, Mozart, the romantic poets, and Nietzsche. GER:DB-Hum

3 units, Win (Rose, J)

RELIGST 23. Introduction to Judaism

The historical development of Jewish religious thought and practice, from the biblical period to the present. Scriptural, liturgical, midrashic, legal, historical, and philosophical texts reflecting that development. The Sabbath, and annual festivals and sacred days. GER:DB-Hum

4 units, Spr (Radwin, A)

RELIGST 24. Introduction to 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. Introduction to Islam

Ideas, foundation texts, competing interpretive hegemonies, and historical compromises and syntheses that shaped and inform Islam. Readings from the Qur'ân, hadîth, and seminal theological texts in translation. GER:DB-Hum, EC-GlobalCom

4 units, not given this year

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.

4 units, Spr (Blair, H)

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 52. The Problem of God

(Formerly 32.) Monotheism is a belief for which people continue to live and die. Philosophical inquiry into the concept of God through its 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, 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, Aut (Gelber, H)

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, Win (Pitkin, B)

RELIGST 101. Classical Islamic Theology

How did attitudes towards God's nature define and distinguish different theological movements in premodern Islam? Were theological differences due to different methods of interpreting the Qur'ân? God's power, free will versus predestination, the age of the

Universe. Political and social contexts. Readings mostly in primary sources. GER:DB-Hum

3 units, Spr (Sadeghi, B)

RELIGST 104. Views of the Human Body in Daoism
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, not given this year

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.

4 units, Win (Hess, L)

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, Win (Carrasco, D)

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 113A. Sacred Space and the Supernatural in Japanese Religion
Ties to place in Japanese religious history, legends, and religious practices. The role of Japan's mountains in the religious imagination.

4 units, not given this year

RELIGST 114A. Sacred Journeys in Chinese Religion
Journey themes in Shamanic, Buddhist, Daoist, and popular Chinese religion from ancient to early modern period. Genres and traditions such as ancient shamanesses and their ecstatic trysts with nature deities, Daoist poets and their literary flights, and monks and their legendary westward journeys in search of Buddhist scripture.

4 units, not given this year

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, Spr (Lerner, A; Gonnerman, M)

RELIGST 116. Daoist Thought, Daoist Religion
Main traditions and lineages of Daoism over its two and a half millennia of history. Sources include translated primary sources and secondary studies.

4 units, not given this year

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 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, Aut (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, Aut (Pitkin, B)

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, Aut (Fonrobert, C; Radwin, A)

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 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 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, Spr (Lyman, R)

RELIGST 135. Daoist Ideals of Sainthood
Differing representations of the ideal of sainthood in Daoist texts from different backgrounds. Views of the Dao and application to self-cultivation, ethics, and government.

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, Win (Bielefeldt, C)

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 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 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, Aut (Staff)

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 religion have been closely related for millennia in the India subcontinent. Topics include theories of sound, mantra, music as yoga, guru-disciple relationship, devotional singing, gods and their relation to music, aesthetic theory, classical and folk forms, and Hindu and Muslim traditions. Practical instruction in music. GER:DB-Hum, EC-GlobalCom

4-5 units, not given this year

RELIGST 159A. Religion and Performance in South Asia
(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, Spr (Hess, L)

RELIGST 167. Medieval Religious Philosophy
(Same as PHIL 101.) Focus is 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, and semiotics. Readings from Augustine, Anselm, Aquinas, Scotus, Ockham. GER:DB-Hum

4 units, not given this year

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, Spr (Gelber, H)

RELIGST 174. Martyrdom in the Ancient World
(Same as CLASSGEN 174.) Jewish, Christian, and pagan narratives of persecution and resistance. Emphasis is on ancient documents in translation. 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, Aut (Gleason, M)

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, Win (Rapp, J)

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, Win (Sheehan, T)

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.

3-5 units, Win (Sadeghi, B)

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.

3-5 units, Spr (Carrasco, D)

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
Recent scholarship. GER:DB-Hum

4 units, not given this year

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 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, Spr (Brose, B)

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, Spr (Staff)

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 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 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 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.
3-5 units, Spr (Sadeghi, B)

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 227. The Qur'ân
(Same as RELIGST 327.) Early history, themes, structure, chronology, and premodern interpretation.relative chronology of passages.
5 units, not given this year

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.
3-5 units, Win (Staff)

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, Spr (Pitkin, B)

RELIGST 240. Contemporary Religious Reflection
(Same as HUMNTIES 196S, RELIGST 340.) Focus is on normative and prescriptive proposals by recent and contemporary philosophers and theologians, as opposed to the domination of Religious Studies by textual, historical, cultural, and other largely descriptive and interpretive approaches. Do such normative and prescriptive proposals belong in the academy? Has Religious Studies exorcised its theological nimbus only to find contemporary religious reflection reappearing elsewhere in the university?
3-5 units, Aut (Sockness, B)

RELIGST 247. Chinese Buddhist Texts
(Same as RELIGST 347.) From the first millennium C.E., including sutra translations, prefaces, colophons, and biographies. Prerequisite: reading competence in Chinese. GER:DB-Hum
3-5 units, Aut (Staff)

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, Spr (McRae, J)

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 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, Win (Harrison, P)

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.
3-5 units, Aut (Blair, H)

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.
3-5 units, Spr (Bielefeldt, C)

RELIGST 260. Martin Buber: Philosopher, Theologian, Revolutionary
How Buber's philosophy of dialogue influenced fields including sociology, education, Bible scholarship, psychology, political philosophy, and Jewish and Christian theology. Focus is on I and Thou, his retellings of Hasidic stories, Bible commentaries, and controversial approach to Zionism. His definition of what it means to be human and to live as part of a human community.
4 units, not given this year

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 271A. Dante's Spiritual Vision
Mysticism, poetry, ethics, and theology in Dante's Divine Comedy. Supplementary readings from classical authors such as St. Augustine and St. Thomas, and from modern writers. Students may take 271A without B. GER:DB-Hum

4-5 units, not given this year

RELIGST 271B. Dante's Spiritual Vision
Mysticism, poetry, ethics and theology in Dante's Divine Comedy. Brief, supplementary readings from both classical authors, like St. Augustine and St. Thomas, and modern writers. Prerequisite: 271A.

4-5 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, Spr (Sockness, B)

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 278. Heidegger: Hermeneutics of the Self
(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, Aut (Sheehan, T)

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
(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, not given this year

RELIGST 290. Majors Seminar
Theories of religion versus religions themselves: attempts to define the phenomenon of religion in anthropology, psychology, sociology, and cultural studies, such as ny Sigmund Freud, Karl Marx, Emile Durkheim, Mircea Eliade, Max Weber, and Clifford Geertz; critical perspectives on the study of religion, such as gender and postcolonialism. WIM

5 units, Win (Gelber, H)

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 (Pitkin, B)

GRADUATE COURSES IN RELIGIOUS STUDIES

Primarily for graduate students; undergraduates may enroll with consent of instructor.

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.

3-5 units, Win (Sadeghi, B)

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, Spr (Carrasco, D)

RELIGST 304A. Theories and Methods
Required of graduate students in Religious Studies. Approaches to the study of religion. Prerequisite: consent of instructor.

4 units, alternate years, 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 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 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, Spr (Sadeghi, B)

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 327. The Qur'ân
(Same as RELIGST 227.) Early history, themes, structure, chronology, and premodern interpretation.relative chronology of passages.

5 units, not given this year

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, Win (Staff)

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, Spr (Pitkin, B)

RELIGST 340. Contemporary Religious Reflection
(Same as HUMNTIES 196S, RELIGST 240.) Focus is on normative and prescriptive proposals by recent and contemporary philosophers and theologians, as opposed to the domination of Religious Studies by textual, historical, cultural, and other largely descriptive and interpretive approaches. Do such normative and prescriptive proposals belong in the academy? Has Religious Studies exorcised its theological nimbus only to find contemporary religious reflection reappearing elsewhere in the university?
3-5 units, Aut (Sockness, B)

RELIGST 347. Chinese Buddhist Texts
(Same as RELIGST 247.) From the first millennium C.E., including sutra translations, prefaces, colophons, and biographies. Prerequisite: reading competence in Chinese.
3-5 units, Aut (Staff)

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, Spr (McRae, J)

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, Win (McRae, J)

RELIGST 350. Modern Western Religious Thought Proseminar
Research methods and materials. May be repeated for credit.
1-5 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, Win (Harrison, P)

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, Aut (Blair, H)

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, Spr (Bielefeldt, C)

RELIGST 359A. Religion and Performance in South Asia
(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, Spr (Hess, L)

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 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, Spr (Sockness, B)

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 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 378. Heidegger: Hermeneutics of the Self
(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, Aut (Sheehan, T)

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
(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, not given this year

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 in Religious Studies
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. Candidacy Essay
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, not given this year

RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES (REES) COURSES

For information on undergraduate and graduate programs in the Center for Russian, East European, and Eurasian Studies, see the "Russian, East European, and Eurasian Studies" section of this bulletin.

UNDERGRADUATE COURSES IN RUSSIAN, EAST EUROPEAN, AND EURASIAN STUDIES

REES 35. Self-Determination in Central Asian Cinema of the 1960s and 1990s
Films with English subtitles from Tajikistan, Uzbekistan, Kazakhstan, Kyrgyzstan, and Turkmenistan. May be repeated once for credit. (AU)
1-2 units, Win (Staff), Spr (Staff)

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, Aut (Staff), given once only

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, Aut (Kollmann, J)

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 (Kollmann, J), Win (Kollmann, J), Spr (Kollmann, J)

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, Aut (Staff), given once only

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, Win (Lapidus, G)

REES 330. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries
(Same as REES 130.) 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, Aut (Kollmann, J)

SCIENCE, TECHNOLOGY, AND SOCIETY (STS) COURSES

For information on undergraduate programs in Science, Technology, and Society, including cognate course lists applicable to degree requirements, see the "Science, Technology, and Society" section of this bulletin. See http://sts.stanford.edu for updated course scheduling information, course syllabi, faculty and staff information, and information about how to declare a major or a minor in STS.

UNDERGRADUATE COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

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 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: Science, Technology, and 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
4-5 units, Win (Shanks, M)

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), alternate years, not given next year

STS 134. History of the Senses
(Same as HISTORY 241G, HISTORY 341G, STS 234.) Technological, medical, philosophical, and scientific history of the five senses, drawing upon readings from antiquity to the present. How physiologists and philosophers have explained the functioning of the senses; how doctors have tampered with them both to help and to hinder; and how technologies including medical devices, scientific instruments, and tools of the arts have continually transformed the nature and experience of sensation. GER:DB-SocSci
4-5 units, not given this year

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, Spr (Lowood, H)

STS 153. Living With Social Technologies
How can technologies facilitate and engage human capacities and needs for social interaction? Do social technologies pose special challenges for policy making and research and how can we respond? Topics include: the emergence of social technologies in cyberspace; gaming, social networking, virtual agents, and social robotics; comparison of communities online and off; technological innovation and new modes of communicating, learning, playing, and working; the social impacts of shifting boundaries between animacy/inanimacy, human/machine, real/virtual.
4 units, Win (Sabanovic, S)

STS 155. Society in the Age of Robots
Predictions, discourse, and applications of robotics and its impacts on individual lives, cultural practices, and social institutions. Are robots the next step in human evolution? How will robotic technologies affect society in their new roles as caretakers, companions, entertainers, teachers, and guides? Can robotics contribute to solving contemporary social issues such as an aging society? Attention to materials from robotics, the social sciences and humanities, and film and fiction; comparison between the U.S. and Japan.
4 units, Spr (Sabanovic, S)

STS 160. Controversy and Closure: The Politics of Technical Expertise
What are the causes and consequences of global warming? Do birth control pills increase the risk of cancer? Was there prewar evidence of WMD in Iraq? How political institutions, culture, and technology shape techno-political advice and common assumptions about who counts as an expert.
4 units, not given this year

STS 165. Science and Engineering in the Security State
How defense research changes how scientists and engineers work. How the research projects of the Cold War shaped practices in disciplines including computing, physics, biology, medicine, environmental sciences, and social sciences. Challenges faced by scientists and engineers in the context of heavy defense spending.
4 units, not given this year

STS 170. Technology in Modern Security Discourse
Technology's central role in discussions of international security issues including nuclear proliferation or containment, ballistic missiles or anti-missiles, biological weapons or vaccines, and data mining or computer security. What uses can and should technology serve in diplomacy? Why are some weapons stigmatized while others are deemed acceptable? How does discourse itself become a weapon? The history of technologies and discourses about them.
4 units, not given this year

STS 176. Technology and Politics
The impact of politics, scientific advice, and government actors on new technologies; their effects on political life. How politics have shaped the development, use, and regulation of information, bio-, nano-, space-based weapons, nuclear power, and greenhouse gas technologies. How technologies such as television, the Internet, and large computer databases have affected democratic politics, freedom, privacy, equality, civil society, and political participation. Focus is on U.S. politics; attention to developments elsewhere.
5 units, offered occasionally

STS 180. Imagining the Computer, Wiring the World
(Same as STS 280.) The theme of revolution in th epopular 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 195A. Honors Research
For students in STS honors program. Goal is submission of proposal.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

STS 195B. Honors Research
For students in STS honors program. Continued study and writing.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

STS 195C. Honors Research
For students in STS honors program. Final work on project.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

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 (Heise, U), Spr (Dupuy, 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, Spr (McGinn, R), alternate years, not given this year

STS 221. The Politics and Ethics of Modern Science and Technology
(Same as HISTORY 257, HISTORY 347.) The WW II decision to build and use the atomic bomb. The controversy over the H-bomb. The Oppenheimer loyalty-security case and the relationship of scientist to the state. Medical experimentation on humans and pitfalls of technology. Relations among science, technology, and university. GER:DB-Hum
4-5 units, 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; Sabanovic, S)

STS 290B. Senior Honors Seminar
For seniors pursuing STS honors. Goal is to analyze data and write up results.
1-5 units, Win (Sabanovic, S)

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 234. History of the Senses
(Same as HISTORY 241G, HISTORY 341G, STS 134.) Technological, medical, philosophical, and scientific history of the five senses, drawing upon readings from antiquity to the present. How physiologists and philosophers have explained the functioning of the senses; how doctors have tampered with them both to help and to hinder; and how technologies including medical devices, scientific instruments, and tools of the arts have continually transformed the nature and experience of sensation.
4-5 units, not given this year

STS 280. Imagining the Computer, Wiring the World
(Same as STS 180.) The theme of revolution in th epopular 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
1-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES COURSES IN SCIENCE, TECHNOLOGY, AND SOCIETY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE SCIENCE, TECHNOLOGY, AND SOCIETY COURSES

OSPFLOR 134F. Modernist Italian Cinema
5 units, Aut (Campani, E)

SLAVIC GENERAL (SLAVGEN) COURSES

These courses are open to all undergraduates and graduate students, are taught in English, and do not require a knowledge of a Slavic language. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in Slavic languages and literatures, see the "Slavic Languages and Literatures" section of this bulletin. For courses in Slavic language instruction, see "Slavic Languages" courses section of this bulletin.

UNDERGRADUATE COURSES IN SLAVIC GENERAL

SLAVGEN 13N. Russia and the Russian Experience
Stanford Introductory Seminar. Preference to freshmen. The political and cultural history of Russia and the Russians: prominent persons, prominent events, and how they shape current attitudes and society. Short works by Russian authors. GER:DB-Hum
3-4 units, Win (Schupbach, R)

SLAVGEN 77Q. Russia's Weird Classic: Nikolai Gogol
Stanford Introductory Seminar. Preference to sophomores. The work and life of Nikolai Gogol, the eccentric founder of Fantastic Realism. The relationship between romanticism and realism in Russian literature, and between popular Ukranian culture and high Russian and W. European traditions in Gogol's oeuvre. The impact of his work on 20th-century modernist literature, music, and art, including Nabokov, literature of the absurd, Shostakovich, Meyerhold, and Chagall. GER:DB-Hum
3-4 units, Aut (Fleishman, L)

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 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 Glatshtevn. 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 Gogol
(Same as SLAVGEN 245.) The Russian leap into European culture after the Napoleonic Wars and the formative period of Russian literature. Readings seen as local literary developments and contemporary European trends including Pushkin's *Eugene Onegin,*

The Belkin Tales, and *The Captain's Daughter*; Lermontov's *Hero of Our Time*; and Gogol's *Petersburg Tales* and *Dead Souls*. GER:DB-Hum, EC-GlobalCom

3-4 units, Aut (Fleishman, L)

SLAVGEN 146. History and Other Theories of Time and Action in the Great Russian Novel
(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 (Fleishman, L)

SLAVGEN 148. The Age of Dissent: 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, Win (Frank, J)

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.

3-4 units, Win (Safran, G)

SLAVGEN 155. Anton Chekhov and the Turn of the Century
(Same as SLAVGEN 255.) Chekhov's art in its Russian literary, historical, philosophical, and political contexts. Short stories and major plays; supplemental readings for graduate students from Chekhov's letters and works by his friends and contemporaries, such as Leskov, Tolstoy, Korolenko, and Gorky. GER:DB-Hum

4 units, Spr (Safran, G)

SLAVGEN 156. Nabokov in the Transnational Context
(Same as COMPLIT 115, COMPLIT 215, SLAVGEN 256.) Nabakov's techniques of migration and camouflage as he inhabits the literary and historical contexts of St. Petersburg, Berlin, Paris, America, and Switzerland. His early and late stories, last Russian novel *The Gift, Lolita* (the novel and screenplay), and *Pale Fire*. Readings in English.GER:DB-Hum

3-4 units, Spr (Greenleaf, M)

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 169. Mermaids, the Firebird, and the Singing Tree: Russian Folklore and Its Theory
(Same as SLAVGEN 269.) Russian culture through its oral folklore and music. Theory, current data and its interpretation, how scholars collect and understand traditional oral poetry, and the lessons of folklore. GER:DB-Hum

3-5 units, not given this year

SLAVGEN 181. Philosophy and Literature
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 units, Win (Anderson, L; Vermeule, B)

SLAVGEN 190. Tolstoy's Anna Karenina in Dialogue with Contemporary Philosophical, Social, and Ethical Thought
(Same as HUMNTIES 197F, SLAVGEN 290.) Themes: institutions of the family and gender; debate about the female body, church, and religion; the decline of privilege and the rise of capital and industry; the meaning of art and the artist; conflicts of law and custom, country and city, andnationalism and cosmopolitanism; and the ascetic rejection of the world. Authors include Marx, Mill, Nietzsche, Dostoevsky, Weber, and Freud. GER:DB-Hum, DB-Hum, EC-EthicReas

3-4 units, Spr (Freidin, G)

SLAVGEN 195. RUSSIAN THEATER
(Same as SLAVGEN 295.) Reading plays in juxtaposition with clips from performances and famous directors' writings (Stanislavsky, Meyerhold, and beyond). Evolution of Russian theatrical theory and practice, with particular attention to the present. Some knowledge of Russian desirable. GER:DB-Hum

3-4 units, Aut (Greenleaf, M)

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 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 Glatshtevn. 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 Gogol
(Same as SLAVGEN 145.) The Russian leap into European culture after the Napoleonic Wars and the formative period of Russian literature. Readings seen as local literary developments and contemporary European trends including Pushkin's *Eugene Onegin, The Belkin Tales,* and *The Captain's Daughter*; Lermontov's *Hero of Our Time*; and Gogol's *Petersburg Tales* and *Dead Souls*.

3-4 units, Aut (Fleishman, L)

SLAVGEN 246. History and Other Theories of Time and Action in the Great Russian Novel
(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 (Fleishman, L)

SLAVGEN 248. The Age of Dissent: 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, Win (Frank, J)

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 t21st century. Authors include Haim Nahman Bialik, Sholem Aleichem, Isaac babel, Osip Mandelstam, Joseph Brodsky, Leonid Tsypkin, Ludmila Ulitskaia, Gary Shteyngardt.

3-4 units, Win (Safran, G)

SLAVGEN 255. Anton Chekhov and the Turn of the Century
(Same as SLAVGEN 155.) Chekhov's art in its Russian literary, historical, philosophical, and political contexts. Short stories and major plays; supplemental readings for graduate students from Chekhov's letters and works by his friends and contemporaries, such as Leskov, Tolstov, Korolenko, and Gorky.

4 units, Spr (Safran, G)

SLAVGEN 256. Nabokov in the Transnational Context
(Same as COMPLIT 115, COMPLIT 215, SLAVGEN 156.) Nabakov's techniques of migration and camouflage as he inhabits the literary and historical contexts of St. Petersburg, Berlin, Paris, America, and Switzerland. His early and late stories, last Russian novel *The Gift, Lolita* (the novel and screenplay), and *Pale Fire*. Readings in English.

3-4 units, Spr (Greenleaf, M)

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 269. Mermaids, the Firebird, and the Singing Tree: Russian Folklore and Its Theory
(Same as SLAVGEN 169.) Russian culture through its oral folklore and music. Theory, current data and its interpretation, how scholars collect and understand traditional oral poetry, and the lessons of folklore.

3-5 units, not given this year

SLAVGEN 290. Tolstoy's Anna Karenina in Dialogue with Contemporary Philosophical, Social, and Ethical Thought
(Same as HUMNTIES 197F, SLAVGEN 190.) Themes: institutions of the family and gender; debate about the female body, church, and religion; the decline of privilege and the rise of capital and industry; the meaning of art and the artist; conflicts of law and custom, country and city, andnationalism and cosmopolitanism; and the ascetic rejection of the world. Authors include Marx, Mill, Nietzsche, Dostoevsky, Weber, and Freud.
3-4 units, Spr (Freidin, G)

SLAVGEN 295. RUSSIAN THEATER
(Same as SLAVGEN 195.) Reading plays in juxtaposition with clips from performances and famous directors' writings (Stanislavsky, Meyerhold, and beyond). Evolution of Russian theatrical theory and practice, with particular attention to the present. Some knowledge of Russian desirable.
3-4 units, Aut (Greenleaf, M)

SLAVGEN 313. Visuality and Literacy Workshop
Visual arts, theater, and literature in the culture of modernity.
1-2 units, not given this year

SLAVIC LANGUAGE (SLAVLANG) COURSES

Students registering for the first time in a first- or second-year course must take a placement test if they had any training in Russian before entering Stanford. All entering students must take Part I (written) of the placement test online during the summer, followed by Part II (oral), to be administered on campus September 17, 2008. Consult the Language Center or http://language.stanford.edu/ for further information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN SLAVIC LANGUAGE

SLAVLANG 1. First-Year Russian, First Quarter
Functionally-based communicative approach, including essential Russian grammar. Russian culture and the Russian view of reality.
5 units, Aut (Marcos, M)

SLAVLANG 2. First-Year Russian, Second Quarter
Functionally-based communicative approach, including essential Russian grammar. Russian culture and the Russian view of reality.
5 units, Win (Marcos, M; Leidy, W)

SLAVLANG 3. First-Year Russian, Third Quarter
Functionally-based communicative approach, including essential Russian grammar. Russian culture and the Russian view of reality.
5 units, Spr (Marcos, M; Leidy, W)

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 (Khassina, E)

SLAVLANG 6. Russian for Native Speakers, Second Quarter
Self-paced.Reading and writing skills and communicating in formal and informal settings. Does not fulfill the University foreign language requirement.
2 units, Win (Neklyudova, E)

SLAVLANG 7. Russian for Native Speakers, Third Quarter
Self-paced.Reading and writing skills and communicating in formal and informal settings. Does not fulfill the University foreign language requirement.
2 units, Spr (Marcos, M)

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 (Schupbach, R)

SLAVLANG 51. Second-Year Russian, First Quarter
More difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. 51: Aut, 52: Win, 53: Spr
5 units, Aut (Khassina, E)

SLAVLANG 52. Second-Year Russian, Second Quarter
More difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. 51: Aut, 52: Win, 53: Spr
5 units, Win (Khassina, E)

SLAVLANG 53. Second-Year Russian, Third Quarter
More difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. 51: Aut, 52: Win, 53: Spr
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 (Schupbach, R)

SLAVLANG 60B. Intermediate Russian Conversation
(AU)
1 unit, Win (Schupbach, R)

SLAVLANG 60C. Advanced Russian Conversation
(AU)
1 unit, Spr (Schupbach, R)

SLAVLANG 60D. East European Breweries and Brewing
(AU)
1 unit, Win (Schupbach, R), Spr (Schupbach, R)

SLAVLANG 60F. Slavic Films Series
AU
1 unit, Win (Schupbach, R)

SLAVLANG 60P. Slav Dom Theme Projects
(AU)
1 unit, Aut (Schupbach, R), Win (Schupbach, R), Spr (Schupbach, R)

SLAVLANG 60T. Teaching Slavic Conversation
(AU)
1 unit, Aut (Schupbach, R), Win (Schupbach, R), Spr (Schupbach, R)

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 (Marcos, M)

SLAVLANG 112. Third-Year Russian, Second Quarter
A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. 111: Aut, 112: Win, 113: Spr (Greenhill)
4 units, Win (Erman, I)

SLAVLANG 113. Third-Year Russian, Third Quarter
A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. 111: Aut, 112: Win, 113: Spr
4 units, Spr (Erman, I)

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 (Greenhill, R)

SLAVLANG 178. 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, Win (Marcos, M)

SLAVLANG 179. 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, Spr (Marcos, M)

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
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, Win (Khassina, E)

SLAVLANG 183. Fifth-Year Russian, Third 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, Spr (Khassina, E)

SLAVLANG 184A. 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, Aut (Greenhill, R)

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, Win (Staff)

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, Spr (Staff)

SLAVLANG 199. Individual Work
Prerequisite: consent of instructor.
1-5 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

GRADUATE COURSES IN SLAVIC LANGUAGE

For graduate students only.

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.
2-5 units, Aut (Staff), Win (Staff), Spr (Staff)

OVERSEAS STUDIES COURSES IN SLAVIC LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

MOSCOW SLAVIC LANGUAGE COURSES

OSPMOSC 10M. Intensive First-Year Russian
9 units, Aut (Kurganova, L)

OSPMOSC 51M. Second-Year Russian
5 units, Aut (Boldyreva, T)

OSPMOSC 111M. Third-Year Russian
5 units, Aut (Filatova, G)

OSPMOSC 177M. Fourth-Year Russian
5 units, Aut (Staff)

SLAVIC LITERATURE (SLAVLIT) COURSES

These courses typically require knowledge of a Slavic language. Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in Slavic languages and literatures, see the "Slavic Languages and Literatures" section of this bulletin. For courses in Slavic language instruction, see "Slavic Languages" courses section of this bulletin.

UNDERGRADUATE COURSES IN SLAVIC LITERATURE

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 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, not given this year

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 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, Spr (Fleishman, L)

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)

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)

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
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, Aut (Fleishman, L)

SLAVLIT 200B. Proseminar in Russian Literary Theory
Corequisite: 305.

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, not given this year

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 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 227. Boris Pasternak and the Poetry of the Russian Avant Garde
The works of Pasternak and his contemporaries Vladimir Mayakovsky and Marina Tsvetaeva; cultural context and the features of Russian avant garde poetics. Readings in Russian.

3-4 units, Win (Fleishman, L)

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 269. Pushkin: Tying and Untying the Threads of 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).

2-3 units, not given this year

SLAVLIT 272. Osip Mandelstam and the Modernist Paradigm
His poetry, prose, cultural criticism as an expression of Russian modernism in contexts including: symbolism, acmeism, and the avant garde; NEP culture; and Stalinism. Mandelstam's legacy in art and Russian postmodernism. Myth of the poet. The cultural paradigm of Soviet civilization. Knowledge of Russian desirable but not necessary. See http://www.stanford.edu/class/slavic272.

2-4 units, not given this year

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, not given this year

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 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, Spr (Fleishman, L)

SLAVLIT 289B. The Literature and Culture of Kievan Rus and Muscovy
Major works in all genres from Kievan Rus and Muscovy (11th through 17th centuries) in their original language. Literature, history, and culture of the period; seminar discussions of the texts. Prerequisite: SLAVLIT 211.

4 units, Spr (Staff)

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, 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)

SOCIOLOGY (SOC) COURSES

Courses are open to all students without prerequisites, unless indicated. For information on undergraduate and graduate programs in the Department of Sociology, see the "Sociology" section of this bulletin.

UNDERGRADUATE COURSES IN SOCIOLOGY

Courses numbered below 100 are introductory courses intended for undergraduates. Courses numbered 100 - 202 are undergraduate-level courses.

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 (Sandefur, R)

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:EC-GlobalCom
3 units, Win (Tuma, N)

SOC 32N. Law in Society
Stanford Introductory Seminar. Preference to freshmen. Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work. Enrollment limited to 16. GER:DB-SocSci, EC-AmerCul
3 units, Aut (Sandefur, R)

SOC 45Q. Understanding Race and Ethnicity in American Society
Stanford Introductory Seminar. Preference to sophomores. A brief historical overview of race in America, race and violence, race and socioeconomic wellbeing, and the future of race relations in America. Enrollment limited to 16. GER:DB-SocSci
5 units, Aut (Snipp, C)

SOC 46N. Race, Ethnic, and National Identities: Imagined Communities
Stanford Introductory Seminar. Preference to freshmen. How new identities are created and legitimated. What does it mean to try on a different identity? National groups and ethnic groups are so large that one individual can know only an infinitesimal fraction of other group members. What explains the seeming coherence of groups? If identities are a product of the imagination, why are people willing to fight and die for them? Enrollment limited to 16. GER:DB-SocSci
3 units, Win (Rosenfeld, M)

SOC 103A. Tutoring: Seeing a Child through Literacy
(Same as EDUC 103A, EDUC 203A, SOC 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. GER:DB-SocSci
4 units, Aut (Juel, C; England, P)

SOC 104. Sociology of Work
Classical and contemporary issues and debates. The effects of a changing workplace on individual workers in the U.S. Topics include: classical issues such as bureaucracy, alienation, and life in the industrial corporation; and contemporary issues such as managerial and professional work, the increase in service work and contracting, globalization, gender and race in the workplace, and maintaining a work/life balance.
5 units, Aut (Parker, A)

SOC 105D. Sociology of Criminal Procedure: Cops and Robbers, Lawyers and Juries
(Same as SOC 205D.) Preference to undergraduates and master's students. Interdisciplinary: law and the social sciences. Major areas in American criminal procedure, including juries, search and seizure, Miranda rights, racial profiling, and the right to counsel. The changing state of the law. Sources include major cases and the work of legal scholars. Social sciences perspectives on how the law works: how reliable are suspects' confessions; do juries listen to expert witnesses; do race and class affect how the police treat people; should social science have a role in deciding what the law should be? Limited enrollment.
5 units, Sum (TafollaYoung, K), given once only

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, Win (Parigi, P)

SOC 106D. Race in Contemporary America: Salad Bowl, Melting Pot, Land of Caublinasians?
(Same as SOC 206D.) The debate on the meaning of race in the U.S. by examining past and present race relations, trends within the emerging multiracial population, and the implications that this new population has on the significance of race in contemporary society. The growing visibility of multiraciality is seen as a sign that race does not matter as much as it did in the past versus evidence that race continues to affect people's lives including those with mixed race backgrounds. Sources include academia and popular media.
5 units, Sum (Ku, M), given once only

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, Spr (Walder, A)

SOC 108. 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, Aut (Parigi, P)

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 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, Win (McAdam, D)

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, Aut (McAdam, D)

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, Aut (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, Win (Chin, L)

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, Aut (England, P)

SOC 125A. Understanding Religion in a Global Context
(Same as SOC 225A.) American and western scholarly thought about religion from social and sociological perspectives. Challenges to assumptions in the 21st century. A framework for understanding issues such as global religious movements, religious nationalism, secular nationalism, and violence as a means to religious ends. Topics include American religious history, contemporary American religions, legal and social interpretations of freedom of religion, definitions of religious rights across the global culture, and strategic responses by policymakers. GER:DB-SocSci
5 units, Spr (Chang, P)

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 130. Education and Society
(Same as 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, not given this year

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
4-5 units, Aut (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, Win (Wimer, C)

SOC 136. Sociology of Law
(Same as SOC 236. Graduate students register for 236; same as LAW 538.) 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, alternate years, not given this year

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 (Sandefur, R)

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, Spr (Grusky, D)

SOC 141A. Social Class, Race, Ethnicity, Health

(Same as HUMBIO 122S.) 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

5 units, Win (Barr, 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 143. Poverty in Brazil: From Empirical Evidence to Anti-poverty Policies

(Same as SOC 243.) The evolution of poverty in Brazil. Poverty indexes, profiles, indicators; income approach, establishment, and use of poverty lines. The working poor, informality, and education. Social security and targeted transfers. The design of anti-poverty policies.

5 units, Spr (Rocha, S)

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, not given this year

SOC 146. Introduction to Comparative Studies in Race and Ethnicity

(Same as CSRE 196C, ENGLISH 172D, HISTORY 65, 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, given next year

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 is on multiracial identities and the shifting boundaries of racial categories in contemporary America. GER:DB-SocSci, EC-AmerCul

5 units, Win (McDermott, M)

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, Spr (Rosenfeld, M)

SOC 149X. Urban Politics

(Same as POLISCI 121, SOC 249X, 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, not given this year

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

5 units, Spr (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, not given this year

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 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. Power, Gender, and the Professions
(Same as SOC 265.) Alternative views of professions and professionals, combining theories of professions and gender. The institutionalization of professional power and professional structure in the 20th century. Changing professional roles in the face of increasing bureaucratization of professional work. The role of gender in professional work, and alternative explanations for gender-based differences. How these forces operate, particularly in the professions of medicine, law, and academics. GER:DB-SocSci

5 units, Spr (Barr, D)

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, Win (Jimenez, T)

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 illustrate 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 (Sorensen, A), Spr (Sorensen, A)

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, Aut (Johnson, J)

SOC 186. Advanced Social Network Analysis
Practical experience and an interdisciplinary perspective on the collection, management, exploration, and analysis of social network data. Emphasis is on developing technical skills for studying large-scale social networks. Topics include theories of social order, small worlds, scientific computing, network sampling, and network dynamics.

5 units, Win (Haynes, J)

SOC 190. Undergraduate Individual Study

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 on-going 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 (Beck, C)

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. Individually arranged internship beginning in Winter Quarter, 8 hours per week. Prospective students must consult with internship coordinator early in Autumn Quarter to plan placement. Reflections and assignments culminate in a research proposal, which may submitted for funding. Internship normally continues in Spring Quarter; research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Corequisite: URBANST 201A.

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)

GRADUATE COURSES IN SOCIOLOGY

Courses numbered 203-299 are open to advanced undergraduates and graduate students. Courses numbered 300 and above are normally offered to matriculated doctoral students only.

SOC 203A. Tutoring: Seeing a Child through Literacy
(Same as EDUC 103A, EDUC 203A, SOC 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.

4 units, Aut (Juel, C; England, P)

SOC 205D. Sociology of Criminal Procedure: Cops and Robbers, Lawyers and Juries
(Same as SOC 105D.) Preference to undergraduates and master's students. Interdisciplinary: law and the social sciences. Major areas in American criminal procedure, including juries, search and seizure, Miranda rights, racial profiling, and the right to counsel. The changing state of the law. Sources include major cases and the work of legal scholars. Social sciences perspectives on how the law works: how reliable are suspects' confessions; do juries listen to expert witnesses; do race and class affect how the police treat people; should social science have a role in deciding what the law should be? Limited enrollment.

5 units, Sum (TafollaYoung, K), given once only

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, Win (Parigi, P)

SOC 206D. Race in Contemporary America: Salad Bowl, Melting Pot, Land of Caublinasians?
(Same as SOC 106D.) The debate on the meaning of race in the U.S. by examining past and present race relations, trends within the emerging multiracial population, and the implications that this new population has on the significance of race in contemporary society. The growing visibility of multiraciality is seen as a sign that race does not matter as much as it did in the past versus evidence that race continues to affect people's lives including those with mixed race backgrounds. Sources include academia and popular media.

5 units, Sum (Ku, M), given once only

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, Spr (Walder, A)

SOC 208. 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, Aut (Parigi, P)

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 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, Win (McAdam, D)

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, Aut (McAdam, D)

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, Aut (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, Aut (England, P)

SOC 225A. Understanding Religion in a Global Context
(Same as SOC 125A.) American and western scholarly thought about religion from social and sociological perspectives. Challenges to assumptions in the 21st century. A framework for understanding issues such as global religious movements, religious nationalism, secular nationalism, and violence as a means to religious ends. Topics include American religious history, contemporary American religions, legal and social interpretations of freedom of religion, definitions of religious rights across the global culture, and strategic responses by policymakers.

5 units, Spr (Chang, P)

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 230. Education and Society
(Same as 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, not given this year

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 (Ramirez, F)

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, Win (Wimer, C)

SOC 236. Sociology of Law

(Same as SOC 136. Graduate students register for 236; same as LAW 538.) 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, alternate years, not given this year

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 (Sandefur, R)

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, Spr (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 243. Poverty in Brazil: From Empirical Evidence to Anti-poverty Policies

(Same as SOC 143.) The evolution of poverty in Brazil. Poverty indexes, profiles, indicators; income approach, establishment, and use of poverty lines. The working poor, informality, and education. Social security and targeted transfers. The design of anti-poverty policies.

5 units, Spr (Rocha, S)

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, not given this year

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 is on multiracial identities and the shifting boundaries of racial categories in contemporary America.

5 units, Win (McDermott, M)

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, Spr (Rosenfeld, M)

SOC 249X. Urban Politics

(Same as POLISCI 121, SOC 149X, 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.

5 units, not given this year

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, Spr (Rosenfeld, M)

SOC 257. Causal Inference in Quantitative Educational and Social Science Research

(Same as EDUC 257C.) 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, 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, not given this year

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 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. Power, Gender, and the Professions
(Same as SOC 165.) Alternative views of professions and professionals, combining theories of professions and gender. The institutionalization of professional power and professional structure in the 20th century. Changing professional roles in the face of increasing bureaucratization of professional work. The role of gender in professional work, and alternative explanations for gender-based differences. How these forces operate, particularly in the professions of medicine, law, and academics.

5 units, Spr (Barr, D)

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, Win (Jimenez, T)

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, Spr (Wotipka, C)

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 (Sorensen, A), Spr (Sorensen, A)

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, Aut (Johnson, J)

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 (Simmons, A)

SOC 305. Graduate Proseminar
For first-year Sociology doctoral students only. Introduction and orientation to the field of Sociology.

1 unit, Aut (Grusky, D)

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 (Walder, A)

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)

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. Prerequisite: consent of instructor. May be repeated for credit. (SSPEP/ICE)

1-5 units, Spr (Ramirez, F)

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.

1-5 units, Aut (Olzak, S; McAdam, D), Win (McAdam, D), Spr (Walder, A; McAdam, D)

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.

3-5 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. Possible activities: participation in ongoing research projects; instruction in new methods; and presentation of ongoing research by students, faculty, or visiting speakers. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

1-5 units, Aut (Granovetter, M; Zhou, X), Win (Granovetter, M; Zhou, X), Spr (Granovetter, M; Zhou, X)

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.

3-5 units, not given this year

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.

3-5 units, alternate years, not given this year

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.

3-5 units, Win (Ridgeway, C)

SOC 321W. Workshop: Social Psychology and Social Structure
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.

1-5 units, Aut (Cook, K; Ridgeway, C), Win (Cook, K; Ridgeway, C), Spr (Cook, K; Ridgeway, C)

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.

3-5 units, Aut (Cook, K)

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.

3-5 units, Spr (Rosenfeld, M)

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, Aut (Ridgeway, C)

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 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 (Dauber, M; 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.

3-5 units, Spr (Sandefur, R)

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.

1-5 units, Aut (Grusky, D; Correll, S), Win (Grusky, D; Correll, S; Tuma, N), Spr (Grusky, D; Correll, S)

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.

3-5 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.

3-5 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, Win (McDermott, M; Carter, P)

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, Spr (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, Win (Parigi, P)

SOC 361. Social Psychology of Organizations
(Same as OB 671.) 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 (Lowery, B)

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.

1-5 units, Aut (McFarland, D), Win (McFarland, D), Spr (McFarland, D)

SOC 362. Organization and Environment
(Same as OB 672.) Leading sociological approaches to analyzing relations of organizations and environments emphasizing dynamics. Theoretical formulations, research designs, and results of empirical studies.

4 units, Aut (Carroll, G)

SOC 363. Social and Political Process in Organizations
(Same as OB 676.) Cognition, attitudes, and behavior 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 may include: organizational learning and decision making; power and conflict; emotions in organizations; mobility and stratification; gender inequality and discrimination; networks; organizational justice and legitimacy; and cultural perspectives on organizations. Prerequisite: Ph.D student.

4 units, Spr (Staff)

SOC 363A. Seminar on Organizational Theory
(Same as EDUC 375A.) The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.

5 units, not given this year

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 364. Perspectives on the Social Psychology of Organizations
(Same as OB 673.) Topics relevant to organizational behavior, drawing on social psychological and sociological research. How theories and methods change as levels of analysis change, focusing on the organizational meso (intermediate between micro and macro) level. Topics vary annually, but may include: organizational learning or routines; power; emotions in organizations; diversity and demography; organizational identity and legitimacy; culture; contagion and diffusion. Focus is on theory development processes, and writing journal articles. Prerequisite: enrollment in a Ph.D. program.

4 units, Win (Staff)

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.

4 units, Aut (Drori, G)

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, Win (Scott, W)

SOC 368W. Workshop: China Social Science
(Same as POLISCI 348R.) 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; Zhou, X; Oi, J), Win (Walder, A; Zhou, X; Oi, J), Spr (Walder, A; Zhou, X; Oi, J)

SOC 369. Social Network Analysis
(Same as EDUC 316.) The educational applications of social network analysis. 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.

3-5 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. Research Workshop: 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 (Reich, R; Meyerson, D), Win (Reich, R; Meyerson, D), Spr (Reich, R; Meyerson, D)

SOC 376. Perspectives on Organization and Environment
(Same as OB 674.) 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 (Barnett, W)

SOC 377. Comparing Institutional Forms: Public, Private, and Nonprofit

(Same as EDUC 377, GSBGEN 346.) 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 (Staff)

SOC 380. Qualitative Methods

Priority to Sociology doctoral students. Emphasis is on observational and interview-based research. Limited enrollment.

3-5 units, not given this year

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. Introduction to statistical packages and programming.

2-3 units, Aut (Levanon, A; Ku, M)

SOC 382. Sociological Methodology II: The General Linear Model

Preference to Sociology doctoral students. The general linear model for discrete and continuous variables. Introduction to model selection, the principles of estimation, assessment of fit, and modeling diagnostics. Enrollment limited to 15. Prerequisites: 281A,B or equivalents.

3-6 units, Win (Tuma, N)

SOC 383. Sociological Methodology III: Advanced 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: 281A,B and 382, or equivalents.

4-5 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. Ongoing student research, methodological problems, and possible solutions.

1-2 units, Aut (Staff)

SOC 385B. Research Practicum II

Continuation of 385A.

1-2 units, 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)

OVERSEAS STUDIES COURSES IN SOCIOLOGY

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

BEIJING SOCIOLOGY COURSES

OSPBEIJ 11. Chinese Society in the Post-Mao Era

5 units, Aut (Walder, A)

BERLIN SOCIOLOGY COURSES

OSPBER 66. Theory from the Bleachers: Reading German Sports and Culture

3 units, Win (Junghanns, W)

FLORENCE SOCIOLOGY COURSES

OSPFLOR 79. Migrations and Migrants: The Sociology of a New Phenomenon

5 units, Win (Allam, K)

SOPHOMORE COLLEGE COURSES

For more information on Sophomore College, see the "Undergraduate Education" section of this bulletin.

ANTHROPOLOGY

ANTHRO 10SC. Darwin, Evolution, and Galápagos

(Same as HUMBIO 17SC.) Lessons from the study of flora and fauna in Galápagos from Darwin's time to today. Adaptation, sexual selection, speciation, and adaptive radiation. The challenges the Galapágos Islands pose for conservation.

2 units, Aut (Durham, W)

BIOLOGY

BIO 10SC. Natural History, Marine Biology, and Research

The biology of Monterey Bay and the coastal mountains and redwood forests of Big Sur. Literary, artistic, and political history. Topics: conservation, sanctuary, and stewardship of the oceans and coastal lands. Meetings with conservationists, authors, environmentalists, politicians, land-use planners, lawyers, scientists, and educators.

2 units, Aut (Thompson, S)

CHEMICAL ENGINEERING

CHEMENG 11SC. Energy Technologies for a Sustainable Future

(Same as MATSCI 11SC.) The scope of the energy problem and global energy issues; options for sustainable energy. Focus is on the scientific basis of sustainable, cutting-edge technologies, including

solar cells, fuel cells, and biofuels emphasizing the fundamental science behind the technologies. Readings include technical information on the science and engineering of sustainable energy technologies. Field trips; laboratory experiments.

2 units, Aut (Bent, S; Clemens, B)

COMPARATIVE LITERATURE

COMPLIT 12SC. Ghost Stories: Why the Dead Return and What They Want From Us

Anxiety about mortality and wisdom about the cultural place of the past in the enduring genre of the ghost story from classical literature to popular film. Memory and regret, mourning and forgetting. Classic authors such as Hoffmann, Poe, James, Joyce, and Ibsen, and more recent authors such Paul Auster, Marie Darrieussecq, Catherine Lim, and Toni Morrison.

2 units, Aut (Berman, R)

COMPUTER SCIENCE

CS 10SC. The Intellectual Excitement of Computer Science

Intellectual tradition of computer science. Topics include analysis of algorithms, computability, cryptography, hardware design, and artificial intelligence.

2 units, Aut (Staff)

DRAMA

DRAMA 11SC. Learning Theater: From Audience to Critic at the Oregon Shakespeare Festival

Ten days and six plays at the Oregon Shakespeare Festival in Ashland. The details of the plays, their interpretation, production, and acting, and their value as entertainment and challenge.

2 units, Aut (Rayner, A)

DRAMA 12SC. Playwriting Lab: The Art of Dramatic Writing

Workshop. Each student develops an original script which is presented in theater by the other students. How to develop, expand, and condition the creative mind. Toipcs including dramatic action, text and subtext, characterization, language, and style. Students function as a theatrical collective where each has the opportunity to participate in reading and serving the vision of each student-author.

2 units, Aut (Freed, A)

ECONOMICS

ECON 13SC. Economic Policies of the Presidential Candidates

Modern finance theory. Financial instruments including stocks, bonds, options, mutual funds, and exchange-traded funds. Historical returns on asset classes. Equity analysis. Capital pricing model. Efficient market hypotheses. Index funds. Meetings with financial managers and venture capitalists.

2 units, Aut (Shoven, J)

ECON 19SC. Land and Water Policies in the West

(Same as HISTORY 19SC, POLISCI 21SC.) Historical development and current status, with a focus on California. Topics include: the political origins and economic implications of federal laws and programs that define and allocate rights to land and water; competition for resources between cities and agriculture; the history of federal involvement with the West; contemporary policies and controversies regarding resource management, agriculture, water, energy, and environmental quality. Field trip to California's Central Valley and Owens Valley.

2 units, Aut (Frisby, T; Kennedy, D; Brady, D)

ELECTRICAL ENGINEERING

EE 10SC. Mathematics of the Information Age

How mathematics is used to shape and direct modern life and work. The mathematics of the information age including CD players, cellular phones, imaging, and the Internet.

2 units, Aut (Osgood, B)

ENVIRONMENTAL EARTH SYSTEM SCIENCE

EESS 12SC. Environmental and Geological Field Studies in the Rocky Mountains

Geologic origin from three billion years ago, paleoclimatology and glacial history, long- and short-term carbon cycle and global climate change, and environmental issues related to changing land-use patterns and increased demand for natural resources. Small groups analyze data to prepare reports and maps.

2 units, Aut (Chamberlain, P)

ETHICS IN SOCIETY

ETHICSOC 10SC. The Meaning of Life: Moral and Spiritual Inquiry through Literature

Short novels and plays as the basis for reflection on ethical values and the purpose of life. Why are people here? How do they find meaningful work? What can death teach 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 people to seek their own destinies? What obligations does one have to others?

2 units, Aut (McLennan, W)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES

GES 12SC. Environmental and Geological Field Studies in the Rocky Mountains

Geologic origin from three billion years ago, paleoclimatology and glacial history, long- and short-term carbon cycle and global climate change, and environmental issues related to changing land-use patterns and increased demand for natural resources. Small groups analyze data to prepare reports and maps.

2 units, Aut (Chamberlain, P)

HISTORY

HISTORY 11SC. How Is a Buddhist

Buddhism as a system of thought, a culture, a way of life, a definition of reality, a method for investigating it, and a mental, physical, and social practice. Buddhism as a total phenomenon. Readings, films, music, and art. How Buddhist practices constitue the world of the Buddhist.

2 units, Aut (Mancall, M)

HISTORY 19SC. Land and Water Policies in the West

(Same as ECON 19SC, POLISCI 21SC.) Historical development and current status, with a focus on California. Topics include: the political origins and economic implications of federal laws and programs that define and allocate rights to land and water; competition for resources between cities and agriculture; the history of federal involvement with the West; contemporary policies and controversies regarding resource management, agriculture, water, energy, and environmental quality. Field trip to California's Central Valley and Owens Valley.

2 units, Aut (Frisby, T; Kennedy, D; Brady, D)

HISTORY 20SC. America in Vietnam

(Same as POLISCI 20SC.) The American intervention in Vietnam, focusing o:n political motives and moral justifications for intervention; the military and political strategies of counterinsurgency and nation building; the political uses of terror and the mobilization strategies of the Viet Cong and N. Vietnam; and consequences of the war at home, including the draft and the efforts of Congress to devise a constitutional remedy to the problem of unilateral, presidential war making. Readings include Michael Herr and Norman Mailer.

2 units, Aut (Goldstein, J; Rakove, J)

HUMAN BIOLOGY

HUMBIO 16SC. Stanford Safari: Field Observations in Our Own Backyard

Interdisciplinary approach to analyzing complex institutions using Stanford as focus; field observation skills including photography. Disciplines include anthropology, sociology, structural and landscape architectures, art, photography, tourism, educational theory, history, climatology, ecology, natural history.

2 units, Aut (Siegel, R)

HUMBIO 17SC. Darwin, Evolution, and Galápagos

(Same as ANTHRO 10SC.) Lessons from the study of flora and fauna in Galápagos from Darwin's time to today. Adaptation, sexual selection, speciation, and adaptive radiation. The challenges the Galapágos Islands pose for conservation.

2 units, Aut (Durham, W)

MATERIALS SCIENCE AND ENGINEERING

MATSCI 10SC. Diamonds from Peanut Butter: Material Technologies and Human History
Technological importance of materials in history is captured in names: the Stone Age, Bronze Age, Iron Age, and now the Information Age or the Silicon Age. How materials have played, and continue to play, pivotal roles in the development of new technologies.

2 units, Aut (Bravman, J)

MATSCI 11SC. Energy Technologies for a Sustainable Future
(Same as CHEMENG 11SC.) The scope of the energy problem and global energy issues; options for sustainable energy. Focus is on the scientific basis of sustainable, cutting-edge technologies, including solar cells, fuel cells, and biofuels emphasizing the fundamental science behind the technologies. Readings include technical information on the science and engineering of sustainable energy technologies. Field trips; laboratory experiments.

2 units, Aut (Bent, S; Clemens, B)

MECHANICAL ENGINEERING

ME 12SC. Hands-on Jet Engines
How jet engines transformed the world through intercontinental travel causing internationalization in daily life. Competition driving improvements in fuel economy, engine lifetime, noise, and emissions.

2 units, Aut (Eaton, J)

MUSIC

MUSIC 12SC. Musical Collisions and Radical Creativity
The margins of musical culture; nonconformist, maverick, and eccentric creative impulses that expand the definition of art. Laboratory atmosphere and daily rehearsals in which students create collaborative works with a final public concert involving collaborations with local musicians and presentations of student-composed works created during the course.

2 units, Aut (Applebaum, M)

POLITICAL SCIENCE

POLISCI 10SC. American Foreign Policy in the 21st Century
The substance of U.S. foreign policy, and the political considerations that influence the making and conduct of American diplomacy. Topics include the prospects for conflict and cooperation among the great powers, regional security, peacekeeping and peacemaking, international terrorism, the proliferation of weapons of mass destruction, the global economy, and the domestic politics of U.S. foreign policy.

2 units, Aut (Blacker, C)

POLISCI 19SC. Food and Politics
Politics of food production and distribution; organic and sustainable farming; federal farm and free trade policies; genetically modified food; animal ethics; and the political context of famine and obesity.

2 units, Aut (Reich, R)

POLISCI 20SC. America in Vietnam
(Same as HISTORY 20SC.) Focus is on political motives and moral justifications for intervention; the military and political strategies of counterinsurgency and nation building; political uses of terror and mobilization strategies of the Viet Cong and N. Vietnam; consequences of the war at home, including the draft and efforts of Congress to devise a constitutional remedy to the problem of unilateral, presidential war making. Readings include Michael Herr and Norman Mailer.

2 units, Aut (Goldstein, J; Rakove, J)

POLISCI 21SC. Land and Water Policies in the West
(Same as ECON 19SC, HISTORY 19SC.) Historical development and current status, with a focus on California. Topics include: the political origins and economic implications of federal laws and programs that define and allocate rights to land and water; competition for resources between cities and agriculture; the history of federal involvement with the West; contemporary policies and controversies regarding resource management, agriculture, water, energy, and environmental quality. Field trip to California's Central Valley and Owens Valley.

2 units, Aut (Frisby, T; Kennedy, D; Brady, D)

SPANISH LANGUAGE (SPANLANG) COURSES

Students who have never studied Spanish before should enroll in SPANLANG 1. Students registering for the first time in a first- or second-year course must take a placement test if they had any training in Spanish before entering Stanford. All entering students who have not taken the Spanish Language Advanced Placement (AP) Exam and received a score of 4 or 5, or who have not taken the SAT II with a score of 630 or above, must take Part I (written) of the placement test online during the summer at http://language.stanford.edu/SPANISH, followed by Part II (oral), to be administered on campus September 17, 2008. Students who have passed the language AP exam with a 4 or 5 or the SAT II with a 630 or above are exempted from the written test, but must take the oral on September 17, 2008 in order to determine their correct placement. Students who have taken the Spanish Language Advanced Placement (AP) and received a score of 5 are eligible for 10 units of credit in Spanish. Consult the Language Center or http://language.stanford.edu/ for further information. Completion of SPANLANG 2A, 3, or 41C fulfills the University language requirement. Students who grew up in homes where Spanish is spoken should take the placement assessment for the special series of courses (21B,22B,23B) designed for these speakers. The bilingual series fulfills the language requirement at Stanford. Potential home-background speak-ers should complete the questionnaire found at http://language.stanford.edu/HOMEBACKGROUND, and attend the assessment for potential home-background speakers administered on September 17, 2008. A grade of 'C' or better is required to enter the next course in a language sequence. Language courses may not be repeated for credit and must be taken in sequence. Second-year students may alternate between the cultural emphasis (11C,12C,13C) and international relations (11R,12R,13R) series if done so in sequence (11,12,13); however, a student may only take one of each level in these series.

UNDERGRADUATE COURSES IN SPANISH LANGUAGE

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 (Ashby, Z), Win (Barletta, L), Spr (Del Carpio, C)

SPANLANG 1A. Accelerated First-Year Spanish
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 (Del Carpio, C), Win (Del Carpio, C)

SPANLANG 2. First-Year Spanish, Second 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 (Sanchez, K), Win (Ashby, Z), Spr (Barletta, L)

SPANLANG 2A. Accelerated First-Year Spanish
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, Win (Brates, V), Spr (Brates, V)

SPANLANG 3. First-Year Spanish, Third 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 (Urruela, M), Win (Urruela, M), Spr (Ashby, Z)

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 (Staff)

SPANLANG 5B. Intensive First-Year Spanish, Part B
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.

5 units, Sum (Staff)

SPANLANG 5C. Intensive First-Year Spanish, Part C
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.

5 units, Sum (Staff)

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 (Ortiz Cuevas, C), Win (Barletta, L), 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 (Gonzalez Flores, F), Win (Renfro, C), Spr (Del Carpio, C)

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. 11R: Aut, 12R: Win, 13R: Spr

4-5 units, Aut (Brates, V)

SPANLANG 12C. Second-Year Spanish: Cultural Emphasis, Second 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 (Urruela, M), Win (Ortiz Cuevas, C), Spr (Catoira, L)

SPANLANG 12R. Second-Year Spanish: Emphasis on International Relations, Second 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 placement. 11R: Aut, 12R: Win, 13R: Spr

4-5 units, Win (Brates, V)

SPANLANG 13C. Second-Year Spanish: Cultural Emphasis, Third Quarter
Sequence integrating culture and language. 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 placement.

4-5 units, Aut (Won, H), Win (Perales, O), Spr (Ortiz Cuevas, C)

SPANLANG 13R. Second-Year Spanish: Emphasis on International Relations, Third 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 placement. 11R: Aut, 12R: Win, 13R: Spr

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 (Barletta, L), Win (Barletta, L), Spr (Urruela, M), 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. 21B: Aut, 22B: Win, 23B: Spr

3-5 units, Aut (Junguito Camacho, M)

SPANLANG 22B. Second-Year Spanish for Heritage Language Students, Second Quarter
Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, both print and non-print such as 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. 11B: Aut, 12B: Win, 13B: Spr

3-5 units, Win (Junguito Camacho, M)

SPANLANG 23B. Second-Year Spanish for Heritage Language Students, Third Quarter
Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, both print and non-print such as 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. 11B: Aut, 12B: Win, 13B: Spr

3-5 units, Spr (Staff)

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 (Staff)

SPANLANG 25B. Intensive Second-Year Spanish, Part B
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 (Staff)

SPANLANG 25C. Intensive Second-Year Spanish, Part C
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 (Staff)

SPANLANG 60A. Beginning Spanish Conversation (AU)
1 unit, Aut (Urruela, M)

SPANLANG 60B. Intermediate Spanish Conversation (AU)
1 unit, Win (Urruela, M), Spr (Urruela, M)

SPANLANG 60C. Advanced Spanish Conversation (AU)
1 unit, not given this year

SPANLANG 60K. Cooking Class (AU)
1 unit, Win (Urruela, M)

SPANLANG 60M. Movie Series (AU)
1 unit, Win (Urruela, M)

SPANLANG 60P. Yost Lecture Series (AU)
1 unit, Aut (Urruela, M), Win (Urruela, M), Spr (Urruela, M)

SPANLANG 60T. Teaching Spanish Conversation (AU)
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 (Perales, O), Win (Perales, O), Spr (Perales, O)

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, Win (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 (Barletta, L), Spr (Kenna, C)

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: 21B, 22B, and 23B or equivalent.
3-5 units, Win (Barletta, L)

SPANLANG 121M. Spanish for Medical Students
(Same as HRP 280.) Goal is a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.
3 units, Aut (Staff)

SPANLANG 122M. Spanish for Medical Students
(Same as HRP 281.) Goal is a practical and rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference 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 rapid command of spoken Spanish. Topics: the human body, hospital procedures, diagnostics, food, and essential phrases for on-the-spot reference 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, Aut (Staff), Spr (Sierra, A)

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

For graduate students only.

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
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. Stanford graduate students restricted to 9 units may take all three courses for a total of 9 units, or two of the courses for a total of 9 units.
3-5 units, Sum (Staff)

SPANLANG 205B. Intensive First-Year Spanish, Part B
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. Stanford graduate students restricted to 9 units may take all three courses for a total of 9 units, or two of the courses for a total of 9 units.
3-5 units, Sum (Staff)

SPANLANG 205C. Intensive First-Year Spanish
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. Stanford graduate students restricted to 9 units may take all three courses for a total of 9 units, or two of the courses for a total of 9 units.
3-5 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)

OVERSEAS STUDIES COURSES IN SPANISH LANGUAGE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

MADRID SPANISH LANGUAGE COURSES

OSPMADRD 12M. Accelerated Second-Year Spanish I
5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 13M. Accelerated Second-Year Spanish II
5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

OSPMADRD 102M. Composition and Writing Workshop for Student in Madrid
3-5 units, Aut (Camblor Portilla, M), Win (Camblor Portilla, M), Spr (Camblor Portilla, M)

SANTIAGO SPANISH LANGUAGE COURSES

OSPSANTG 12S. Accelerated Second-Year Spanish, Part I: Chilean Emphasis
5 units, Aut (Abad, M), Win (Abad, M), Spr (Abad, M)

OSPSANTG 13S. Accelerated Second-Year Spanish, Part II: Chilean Emphasis
5 units, Aut (Abad, M), Win (Abad, M), Spr (Abad, M)

OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago
3-5 units, Aut (Bobbert, A), Win (Staff), Spr (Staff)

SPANISH LITERATURE (SPANLIT) COURSES

Students interested in literature and literary studies should also consult course listings in Chinese, Classics, Comparative Literature, English, French, German, Italian, Japanese, Portuguese, Slavic Languages and Literatures, Spanish, and Modern Thought and Literature. Undergraduate and graduate majors should also consult the listings of the Division of Literatures, Cultures, and Languages. For information on undergraduate and graduate programs in Spanish, see the "Spanish and Portuguese" section of this bulletin. For courses in Spanish language instruction, see "Spanish Language" courses section of this bulletin.

SPANISH COURSE CATALOG NUMBERING

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 Asian Languages, 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.

1. 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)
2. 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.

UNDERGRADUATE COURSES IN SPANISH LITERATURE

SPANLIT 102N. Contemporary Latin American Theater
Stanford Introductory Seminar. Representative playwrights and theater troupes of Spanish speaking Latin America and the Caribbean, emphasizing the 60s and 70s. Topics: representation and politics; theatrical language and poetics; avant gardes and performance; teatro comprometido; psychodrama; influence of Brecht, Artaud, and the Theater of the Absurd. Plays by Emilio Carballido, Sabina Berman, Virgilio Piñera, Jose Triana, René Marqués, Luis Rafael Sánchez, La Candelaria, Yuyachkani, Osvaldo Dragún, Griselda Gambaro, Eduardo Pavlovsky, Egon Wolff. GER:DB-Hum

3-4 units, Aut (Briceno, X)

SPANLIT 105N. Don Quixote
Stanford Introductory Seminar. Preference to freshmen. Topics include: theories of language and the novel; history of early modern Iberia; Muslims in Europe. Close reading technique. Sources include filmed version. GER:DB-Hum

3-4 units, Aut (Barletta, V)

SPANLIT 106N. Contemporary Latin American Novel in Translation
Stanford Introductory Seminar. Preference to freshmen. Representative Latin American novelists who attained international readership after the literary boom. Critical readings and theoretical debates. Topics include: latinoamericanidad, reactions to magical realism, crime and the city, politics of translation, economies of prestige, revisions of dictatorship, relations with contemporary art, representations of class and gender, globalization. Works by Piglia, Vallejo, Aira, Bellatin, Melo, and Bolaño. Film adaptations by Piñevro and Schroeder. GER:DB-Hum

3-4 units, Spr (Hoyos, H)

SPANLIT 109Q. Ten Latin American Protagonists who Changed the World
Stanford Introductory Seminar. Preference to sohomores. Life stories and portraits of Eva Peron, Frida Kalho, Che Guevara, Michelle Bachelet, sub-comandante Marcos, Lula , Evo Morales, Hugo Chavez, Pele, and Victor Jara. The dynamics of Latin American culture. Sources include documentaries, film, video, news, readings, and archives. GER:DB-Hum

3-4 units, Win (Ruffinelli, J)

SPANLIT 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 units, Win (Surwillo, L)

SPANLIT 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 (Sanchez, J)

SPANLIT 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.

3-5 units, Win (Hoyos, H)

SPANLIT 136. Survey of 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, Win (Predmore, M)

SPANLIT 157. Introduction to Medieval and Early Modern Iberian Literatures
(Same as PORTLIT 157.) 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)

SPANLIT 161. Survey of 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)

SPANLIT 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)

SPANLIT 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)

SPANLIT 193. The Cinema of Pedro Almodóvar
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, Aut (Ballo, J)

SPANLIT 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)

SPANLIT 219. The Iberian Inquisitions on Trial: Literature, Painting, Cinema, and History
Comparative analysis of how the Spanish and Portuguese Inquisitions have been represented during their time and in the present. Sources include trial documents, literature (Cervantes, Lope de Vega, Saramago, Delibes, Riera), paintings (Berruguete, Goya), movies (Ripstein, Uribe), and current scholarship. Cultural, aesthetic, and political connotations and significance.
3-5 units, Win (Builes, R)

SPANLIT 230E. Writing on the Ocean: The Tragic Maritime Literature of the Iberian Empires
The political and aesthetic dimensions of literary products of the Catalan, Portuguese, and Spanish empires that uncover trauma and defeat and chronicle natural disaster, piracy, kidnap, and rape, human and financial loss. These texts open the door to issues such as colonialism, slavery, nation building, religion, gender, and science. Sources include Martorell, Curial e Güelfa, Guevara, Camões, Cervantes, and Portuguese shipwreck narratives. Discussions and texts in English; originals available.
3-5 units, Spr (Builes, R)

SPANLIT 241. The Short Story: Theory and Praxis
Creative writing workshop in Spanish. Latin American and Spanish short stories through the theory and craft of this genre. The formal elements of fiction including character and plot development, point of view, and creating a scene. Students write an original short story. Readings include Cervantes, Clarín, Borges, Ayala, García Márquez, and Piglia. No previous experience with creative writing required.
3-5 units, Aut (Santana, C)

SPANLIT 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, Aut (Hoyos, H)

SPANLIT 248. Politics, Terrorism, and Documentary Films in South America
State terrorism and revolution in S. America (Argentina, Brazil, Chile, and Uruguay) from 1980 to 2008 through testimonies, literary and history texts, and documentary films. GER:DB-Hum
3-5 units, Spr (Ruffinelli, J)

SPANLIT 275. Cuban Cinema since the Revolution
Fifty years of Cuban cinema, with an emphasis on the social and political changes inside the Cuban revolution and its reflections and consequences in film production. Films which deal the role of women in society (*Retrato de Teresa*), migration (*Memorias del subdesarrollo, Lejanía*), history (*La última cena, Lucia*), youth (*Personal Belongings, El telón de azúcar*), including films made by Cubans in the U.S. (El super).
3-5 units, Win (Ruffinelli, J)

SPANLIT 278. Senior Seminar: The Novelas ejemplares by Miguel de Cervantes and the Culture of the Baroque
Cervantes' representation of a new world characterized by geographical, social and cultural plurality. Topics include: the Baroque space (Deleuze); the fascination of alterity; the imperative of honor and the hermeneutic of defaud and disappointment; the theatralization of the environment and the new rhetoric; the language of the body and women as protagonist; neoplatonism; a new conciousness of authorship. Texts by Cervantes, Mraraval, and Villari. GER:DB-Hum
3-5 units, Spr (Sanchez, J)

SPANLIT 278A. Senior Seminar: Love and Politics in Latin America from Romanticism to Postmodernism
Tthe relationship between love and power through representative literary texts from the 19th and 20th centuries. Topics: romanticism and the nation; modernism and postmodernism; affinities and kinship; love and desire; and gender, sexualities, and revolution. Authors: Isaacs, Bombal, Girondo, Vallejo, Neruda, García Marquéz, Córtazar, Valenzuela, Lispector. Film adaptations: *El beso de la mujer araña, La virgen de los sicarios, Dona Flor e Seus dois maridos*. May be repeated for credit.
3-5 units, Win (Briceno, X)

SPANLIT 293E. Baroque and Neobaroque
(Same as COMPLIT 233, ENGLISH 233.) 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, Win (Greene, R)

GRADUATE COURSES IN SPANISH LITERATURE

Primarily for graduate students; undergraduates may enroll with consent of instructor.

SPANLIT 206. Language Use in the Chicano Community
(Same as EDUC 242.) 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

SPANLIT 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

SPANLIT 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, Aut (Predmore, M)

SPANLIT 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)

SPANLIT 317. Documentary Cinema in Spain: Between Reality and Fiction
Focus is on the works of directors and films that employ the expressive resorts of fiction cinema to delve into the dramaturgy of the real. The trend in Spanish documentary cinema that has formalized an original filmic way of writing to create a new type of dramatic emotion in dialogue with the ups and downs of history, culture, society, and politics.
3-5 units, Aut (Ballo, J)

SPANLIT 323. Renaissance/Early Modern Seminar
(Same as HUMNTIES 323.) Focus is on this period as it records the impact of major historical forces: the advent of printing; the reappropriation of classical thought; the expansion of trade; revolutions in religion; the exploration of uncharted realms of the self, the world, and the heavens; and the rise of historiography. Authors: Attar, de Pizan, Pico della Mirandola, Columbus, De Las Casas, Machiavelli, Luther, Montaigne, Marlowe, Donne, Shakespeare, and Galileo.
3-5 units, Spr (Barletta, V)

SPANLIT 329. The Valencian Segle d'Or
Major works written in Catalan from the 15th century. Authors and texts may include: Jordi de Sant Jordi; Ausiàs March; Jaume Roig; Joan Roís de Corella; Curial e Güelfa; and Tirant lo Blanc.
3-5 units, Win (Barletta, V)

SPANLIT 342. The Duty of Mischief: César Aira's Writing as Cultural Critique
Aira's fiction as a prism on contemporary society, emphasizing phenomena such as consumerism, escapism, globalization, and the crossroads between visuality and the political. Topics include: Aira's place within and against the Argentine and Latin American traditions; dialogues with theoretical discourses of Jameson, Debord, and Derrida; novelitas as interventions; genre and gender; body politics; nonsequitur as narrative structure; utopia; science fiction as high culture; and relations to contemporary art.
3-5 units, Aut (Hoyos, H)

SPANLIT 343. Nations, Continents, Worlds: Ortega and the Ibero-American Essay
Theory of essays and modernity and conceptions of the Ibero-American essay. The search for national identify as the final phase of colonialism, 1911-1928, including Ariel, Meditaciones del Quijote, Visión de Capahuac, La Nacionaliat Catalana. Post-WW II recognition of the need for continent-wide thought that supersede national narratives in Europe (*Rebelión de las Masas, Rapto de Europa de Zambrano*) and the Americas (*Ultima Tule, La Invención de América Mestiza*). Acceptance of the Cold War that produces an essay that is cosmopolitan, universal, post-national, and abandons prior philosophical normativism.
3-5 units, Win (Villacañas-Berlanga, J)

SPANLIT 350. Roberto Bolaño: The Savage Detectives
The impact of Bolaño's novel in contemporary literature. The historical and cultural context of exile, Latin America as a utopia, the search for cultural identity, dialogue with other novels, the boom of the L.A. novel, the 60s, the 1968 student revolt, Mexico as an enigma, and literature as a way of understanding reality.
3-5 units, Spr (Ruffinelli, J)

SPANLIT 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)

OVERSEAS STUDIES COURSES IN SPANISH LITERATURE

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE SPANISH LITERATURE COURSES

OSPFLOR 73. On the Way to Fascism
4 units, Spr (Resina, J)

OSPFLOR 74. Italy in the Foreign Imaginary
4 units, Spr (Resina, J)

MADRID SPANISH LITERATURE COURSES

OSPMADRD 22. Spain on Stage: Theater and Performance in 2009
5 units, Spr (Surwillo, L)

OSPMADRD 24. Spain and Africa through the Ages
3 units, Spr (Surwillo, L)

OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World
4 units, Aut (Tejerina-Canal, S)

OSPMADRD 41. Dissidence and Continuity: Spanish Theater, 1907 to the Present
4 units, Win (Tejerina-Canal, S)

OSPMADRD 45. Women in Art: Case Study in the Madrid Museums
4 units, Win (Doménech López, J)

OSPMADRD 67. Women in Spain: From Tradition to Postmodernity
5 units, Spr (Botella Ordinas, E)

SANTIAGO SPANISH LITERATURE COURSES

OSPSANTG 10. Borges and Argentina
4-5 units, Win (Missana, S)

OSPSANTG 14. Women Writers of Latin America in the 20th Century
4-5 units, Aut (Missana, S)

OSPSANTG 17. Chilean Fiction of the 20th Century
4-5 units, Spr (Missana, S)

OSPSANTG 104X. Modernization and Culture in Latin America
5 units, Aut (Subercaseaux, B)

OSPSANTG 118X. Artistic Expression in Latin America
5 units, Win (Albornoz, C)

SPECIAL LANGUAGE PROGRAM (SPECLANG) COURSES

See the "Special Language Program" section of this bulletin for more information.

UNDERGRADUATE COURSES IN SPECIAL LANGUAGE PROGRAM

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 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
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Ukrainian culture.
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
3 units, Aut (Jarboe, L)

SPECLANG 130B. Intermediate Ukrainian, Second Quarter
3 units, Win (Jarboe, L)

SPECLANG 130C. Intermediate Ukrainian, Third Quarter
3 units, Spr (Jarboe, L)

SPECLANG 134A. Beginning Haitian Creole
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Haitian culture.
3 units, not given this year

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
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Tagalog culture.
3 units, Win (Staff)

SPECLANG 145A. Intermediate Tagalog, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Staff)

SPECLANG 145B. Intermediate Tagalog, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Staff)

SPECLANG 145C. Intermediate Tagalog, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Spr (Staff)

SPECLANG 150A. Beginning Vietnamese, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Vietnamese culture.
3 units, Aut (Staff)

SPECLANG 150B. Beginning Vietnamese, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Vietnamese culture.
3 units, Win (Staff)

SPECLANG 150C. Beginning Vietnamese, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Vietnamese culture.
3 units, Spr (Staff)

SPECLANG 151A. Intermediate Vietnamese, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Staff)

SPECLANG 151B. Intermediate Vietnamese, Second quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Staff)

SPECLANG 151C. Intermediate Vietnamese, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Spr (Staff)

SPECLANG 152A. Beginning Hindi, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hindi culture.
3 units, Aut (Staff)

SPECLANG 152B. Beginning Hindi, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hindi culture
4 units, Win (Malhotra, P)

SPECLANG 152C. Beginning Hindi, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hindi culture.
4 units, Spr (Malhotra, P)

SPECLANG 153A. Intermediate Hindi, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
4 units, Aut (Staff)

SPECLANG 153B. Intermediate Hindi, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
4 units, Win (Staff)

SPECLANG 153C. Intermediate Hindi, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
4 units, Spr (Staff)

SPECLANG 154A. Advanced Hindi, First Quarter
4 units, Aut (Staff)

SPECLANG 154B. Advanced Hindi, Second Quarter
4 units, Win (Staff)

SPECLANG 154C. Advanced Hindi, Third Quarter
4 units, Spr (Staff)

SPECLANG 156A. Beginning Indonesian, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Indonesian culture.
3 units, Aut (Staff)

SPECLANG 156B. Beginning Indonesian, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Indonesian culture.
3 units, Win (Staff)

SPECLANG 156C. Beginning Indonesian, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Indonesian culture.
3 units, Spr (Staff)

SPECLANG 157A. Intermediate Indonesian, First Quarter
3 units, Aut (Staff)

SPECLANG 157B. Intermediate Indonesian, Second Quarter
3 units, Win (Staff)

SPECLANG 157C. Intermediate Indonesian, Third Quarter
3 units, Spr (Staff)

SPECLANG 158A. Advanced Indonesian, First Quarter
3 units, Aut (Staff)

SPECLANG 158B. Advanced Indonesian, Second Quarter
3 units, Win (Staff)

SPECLANG 158C. Advanced Indonesian, Third Quarter
3 units, Spr (Staff)

SPECLANG 159A. Beginning Punjabi, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Punjabi culture.
3 units, Aut (Dhillon, R)

SPECLANG 159B. Beginning Punjabi, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Punjabi culture.
3 units, Win (Dhillon, R)

SPECLANG 159C. Beginning Punjabi, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Punjabi culture.
3 units, Spr (Dhillon, R)

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
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Czech culture.
3 units, Win (Dusatko, J)

SPECLANG 164C. Beginning Czech, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Czech culture.
3 units, Spr (Staff)

SPECLANG 165A. Intermediate Czech, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Dusatko, J)

SPECLANG 165B. Intermediate Czech, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Dusatko, J)

SPECLANG 165C. Intermediate Czech, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
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 (Bartoszewski, L)

SPECLANG 167B. Beginning Polish, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Polish culture.
3 units, Win (Bartoszewski, L)

SPECLANG 167C. Beginning Polish, Third Quarter
First year sequence enables students to express themselves in spoken and written Polish while mastering basic vocabulary and grammar structures. Introduction to the culture.
3 units, Spr (Bartoszewski, L)

SPECLANG 168A. Intermediate Polish, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Bartoszewski, L)

SPECLANG 168B. Intermediate Polish, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Bartoszewski, L)

SPECLANG 168C. Intermediate Polish, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Spr (Bartoszewski, L)

SPECLANG 170A. Beginning Modern Greek, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Greek culture.
4 units, Aut (Staff)

SPECLANG 170B. Beginning Modern Greek, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Greek culture.
4 units, Win (Staff)

SPECLANG 170C. Beginning Modern Greek, Third Quarter
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.
4 units, Spr (Staff)

SPECLANG 172A. Modern Greek Language and Culture through Literature and Film, First Quarter
Accelerated. Vocabulary enrichment through multimedia, online materials.
4 units, Aut (Prionas, E)

SPECLANG 172B. Modern Greek Language and Culture through Literature and Film, Second Quarter
Accelerated. Vocabulary enrichment through multimedia, online materials.
4 units, Win (Prionas, E)

SPECLANG 172C. Modern Greek Language and Culture through Literature and Film, Third Quarter
Accelerated. Vocabulary enrichment through multimedia, online materials.
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)

SPECLANG 173B. Beginning Hungarian, First Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hungarian culture.
3 units, Win (Szoke, E)

SPECLANG 173C. Beginning Hungarian, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hungarian culture.
3 units, Spr (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
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Quechua culture.
3 units, Win (Fajardo, J)

SPECLANG 174C. Beginning Quechua, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Quechua culture.
3 units, Spr (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 (Moore, R)

SPECLANG 177B. Intermediate Thai, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, not given this year

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
Comprehension and production skills; cultural awareness necessary for communication. Limited enrollment.
4 units, Win (Haas, C)

SPECLANG 178C. Beginning Sign Language, Third Quarter
Comprehension and production skills; cultural awareness necessary for communication. Limited enrollment.
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
Additional functional structures, lexical items, and history. Limited enrollment.
4 units, Win (Haas, C)

SPECLANG 179C. Intermediate Sign Language, Third Quarter
Additional functional structures, lexical items, and history. Limited enrollment.
4 units, Spr (Haas, C)

SPECLANG 184A. Intermediate Sanskrit, First Quarter
3 units, Aut (Porta, F)

SPECLANG 184B. Intermediate Sanskrit, Second Quarter
3 units, Win (Porta, F)

SPECLANG 184C. Intermedidate Sanskrit, Third Quarter
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 (Staff)

SPECLANG 186B. Beginning Serbo-Croatian, Second Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Serb and Croat culture.
3 units, Win (Staff)

SPECLANG 186C. Beginning Serbo-Croatian, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Serb and Croat culture.
3 units, Spr (Staff)

SPECLANG 188B. Advanced Serbo-Croatian, Second Quarter
3 units, not given this year

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
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Kazakh culture.
3 units, Win (Kunanbaeva, A)

SPECLANG 192C. Beginning Kazakh, Third Quarter
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Kazakh culture.
3 units, Spr (Kunanbaeva, A)

SPECLANG 193A. Intermediate Kazakh, First Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Aut (Kunanbaeva, A)

SPECLANG 193B. Intermediate Kazakh, Second Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
3 units, Win (Kunanbaeva, A)

SPECLANG 193C. Intermediate Kazakh, Third Quarter
Grammar structures and vocabulary through authentic materials. Cultural proficiency.
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, alternate years, not given this year

SPECLANG 215B. Modern Greek for Heritage Language Learners, Second Quarter
For students of Greek background. Sources include authentic texts, multimedia materials, and Greek media.
2-4 units, alternate years, not given this year

SPECLANG 215C. Modern Greek for Heritage Language Learners, Third Quarter
For students of Greek background. Sources include authentic texts, multimedia materials, and Greek media.
2-4 units, alternate years, not given this year

SPECLANG 238A. Beginning Uzbek, First Quarter
3 units, Aut (Kunanbaeva, A)

SPECLANG 238B. Beginning Uzbek, Second Quarter
3 units, Win (Staff)

SPECLANG 238C. Beginning Uzbek, Third Quarter
3 units, Spr (Staff)

SPECLANG 241A. Ukrainian for Speakers of a Slavic Language, First Quarter
3 units, Aut (Fleishman, E)

SPECLANG 241B. Ukrainian for Speakers of a Slavic Language, Second Quarter
3 units, Win (Staff)

SPECLANG 241C. Ukrainian for Speakers of a Slavic Language, Third Quarter
3 units, Spr (Staff)

GRADUATE COURSES IN SPECIAL LANGUAGE PROGRAM

For graduate students only.

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

All seminars require a brief application. See the *Stanford Introductory Seminars Course Catalogue* published each September, or http://introsems.stanford.edu. Due dates for 2008-09 applications for both freshman and sophomore preference courses are: Autumn Quarter, 5 p.m., September 19; Winter Quarter, noon, December 5; Spring Quarter, noon, March 13. Key: F = preference to freshmen; S = preference to sophomores; Dial = dialogue; Sem = Seminar.

AERONAUTICS AND ASTRONAUTICS STANFORD INTRODUCTORY SEMINARS

AA 113N. Structures: Why Things Don't (and Sometimes Do) Fall Down
(F,Sem) 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 from Odysseus's bow to modern skis; 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)

AMERICAN STUDIES STANFORD INTRODUCTORY SEMINARS

AMSTUD 114N. Visions of the 1960s
(S,Sem) 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)

ANESTHESIA STANFORD INTRODUCTORY SEMINARS

ANES 70Q. The Psychosocial and Economic Ramifications of Critical Illness
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The impact of critical illness on a patient and family members; difficulties involved in the decision making process for the patient, family, and healthcare professionals. Topics include: conventional views of death and dying, epidemiology of critical illness, grief, coping skills, cultural variations, euthanasia and withdrawal of care, palliative care and hospice, advanced directive and legal aspects of medical catastrophe, psychosocial dynamics of family meetings, and emotional ramifications of medical decisions.
3 units, Spr (Lin, L)

ANTHROPOLOGY STANFORD INTRODUCTORY SEMINARS

ANTHRO 8N. The Anthropology of Globalization
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Anthropological approach to how cultural change, economic restructuring, and political mobilization are bound up together in the process of globalization. GER:DB-SocSci
3-4 units, Aut (Ebron, P)

ANTHRO 16N. Ethnographies of North America: An Introduction to Cultural and Social Anthropology
(F,Sem) 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 18N. Glimpses of Divinity
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. How human beings search for and identify the presence of the divine in everyday human life.Sources include spiritual classics in the Christian, Jewish and Hindu traditions including works by Augustine, Teresa of Avila, Jonathan Edwards, the Bhagvad Gita, the Zohar, and some ethnographies of non-literate traditions.
3 units, Win (Luhrmann, T)

ANTHRO 22N. Maya Hieroglyphic Writing
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Decipherment of classic Maya writing. Principles of archaeological decipherment. Maya calendrical, astronomical, historical, mythological, and political texts on stone, wood, bone, shell, murals, ceramics, and books (screenfold codices). Archaeology and ethnohistory of Maya scribal practice and literacy. Related Mesoamerican writing systems. The evolution of writing and the relevance of writing to theories of culture and civilization. GER:DB-SocSci, EC-GlobalCom
4 units, Spr (Fox, J)

APPLIED PHYSICS STANFORD INTRODUCTORY SEMINARS

APPPHYS 68N. Lasers and Photons
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The physics of lasers and their light. Computer applets and hands-on investigations. Historical development of ideas about light: electromagnetic waves; particles; special relativity; quantum theory; and the laser. Properties of laser light: wavelength and frequency; coherence; polarization; interference; diffraction; and linear and nonlinear optics. Lasers and applications from Schawlow and Townes to Linac Coherent Light Source. Prerequisites: high school physics and calculus. GER:DB-EngrAppSci
3 units, Aut (Bucksbaum, P)

APPPHYS 79N. Energy Choices for the 21st Century
(F,Sem) 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)

BIOCHEMISTRY STANFORD INTRODUCTORY SEMINARS

BIOC 118Q. Genomics and Medicine
(S,Sem) 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)

BIOENGINEERING STANFORD INTRODUCTORY SEMINARS

BIOE 70Q. Medical Device Innovation
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Commonly used medical devices in different medical specialties. Guest lecturers include Stanford Medical School physicians, entrepreneurs, and venture capitalists. How to identify clinical needs and design device solutions to address these needs. Fundamentals of starting a company. Field trips to local medical device companies; workshops. No previous engineering training required.
3 units, Spr (Mandato, J; Milroy, J; Doshi, R)

BIOLOGY STANFORD INTRODUCTORY SEMINARS

BIO 13N. Environmental Problems and Solutions
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Students do independent investigations of current environmental problems, analyzing differing views of them and discussing possible solutions. Each student gives two seminar presentations and leads two seminar discussions. Short, documented position papers are written for policy makers. GER:DB-NatSci
3 units, Spr (Ehrlich, P)

BIO 14N. Plants and Civilization
(F,Sem) 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 15N. Environmental Literacy
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Lack of public understanding of the details of most environmental problems is cited as a cause of environmental deterioration. Good citizenship requires literacy about the elements of the scientific and decision making processes that accompany most environmental issues: what can happen, what are the odds, how can the credibility of sources of expertise be assessed, which components of environmental debates deal with factual and theoretical issues, and which are political value judgments? GER:DB-NatSci
3 units, Win (Schneider, S)

BIO 25N. Biogeography of Disease
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Geographic distribution of disease. Biotic interactions among vectors, hosts, and environment. Influence of climatic and environmental change on spread and virulence of disease. Human and animal diseases. Primary literature. GER:DB-NatSci
3 units, Aut (Hadly, E)

BIO 25Q. The Molecular Basis of Genetic Disease
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Focus is on two genetic diseases resulting from the production of protein molecules that are unable to fold into their native conformations, called conformational diseases: cystic fibrosis and amyotrophic lateral sclerosis or Lou Gehrig's disease. Hypotheses and controversies surrounding the molecular basis of these disorders, and implications for novel therapeutics. Readings from research literature. GER:DB-NatSci
3 units, Spr (Kopito, R)

BIO 26N. Maintenance of the Genome
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Focus is on DNA repair systems which scan the genome to ensure genomic stability in the face of natural endogenous threats to DNA and those due to radiation and chemicals in the external environment. Redundancy of the genetic message ensured by complementary DNA strands facilitates recovery of information when one of the strands is altered. Predisposition to cancer often implicates a defective DNA repair gene. 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
(S,Sem) 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 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
(F,Sem) 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)

BIOMEDICAL INFORMATICS STANFORD INTRODUCTORY SEMINARS

BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution

(S,Sem Same as GENE 109Q.) Stanford Introductory Seminar. Preference to sophomores. For non-science majors. 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)

CHEMICAL ENGINEERING STANFORD INTRODUCTORY SEMINARS

CHEMENG 35N. Renewable Energy for a Sustainable World

(F,Sem) 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.

3 units, Aut (Swartz, J)

CHEMENG 60Q. Environmental Regulation and Policy

(S,Sem) 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

(S,Sem) 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

(S,Sem) 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)

CHEMISTRY STANFORD INTRODUCTORY SEMINARS

CHEM 24N. Nutrition and History

(F,Sem) 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.

2 units, Spr (Huestis, W)

CHEM 25N. Science in the News

(F,Sem) 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?

(S,Sem) Stanford Introductory Seminar. 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.

2 units, Win (Djerassi, C)

CIVIL AND ENVIRONMENTAL ENGINEERING STANFORD INTRODUCTORY SEMINARS

CEE 31Q. Accessing Architecture Through Drawing

(S,Sem) 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), Spr (Barton, J)

CEE 46Q. Fail Your Way to Success

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. How to turn failures into successes; cases include minor personal failures and devastating engineering disasters. How personalities and willingness to take risks influence the way students approach problems. Field trips, case studies, and guest speakers applied to students day-to-day interactions and future careers. Goal is to redefine what it means to fail. GER:DB-EngrAppSci

3 units, Spr (Clough, R)

CEE 48N. Organizing Global Projects

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Students teams model and simulate crosscultural 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.

4 units, Aut (Levitt, R)

CLASSICS ART/ARCHAEOLOGY STANFORD INTRODUCTORY SEMINARS

CLASSART 21Q. Eight Great Archaeological Sites in Europe

(S,Sem) 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, Win (Shanks, M)

CLASSICS GENERAL STANFORD INTRODUCTORY SEMINARS

CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent

(F,Sem Same as DRAMA 12N.) Stanford Introductory Seminar. 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

4 units, Win (Rehm, R)

CLASSGEN 45N. Conversations: Catullus, Virgil, and their Influence on the Prose and Poetry of Robert Frost

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Poems by Catullus and Virgil (in Latin or in translation) and by Robert Frost. Why Frost kept the poetry of Catullus close at hand throughout his life; the relationship between a writer's reading and writing; and how emotional experience can be transmuted into verbal at. Sound, rhythm, meter, the order of words, artful construction of short poems, and the dramatic function of conversation. Poetry recitation and creative writing.

3-5 units, Spr (Lain, N)

CLASSGEN 48N. Ethical Wisdom in Greek Tragedy and Philosophy

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. What sorts of ethical values are found in Greek tragedies? Modes of ethical wisdom promoted and enacted in Greek tragedy and philosophy in the classical period emphasizing modes of wisdom that reflected traditional Greek religion and traditional social and political values in democratic Athens. GER:DB-Hum

3-5 units, Spr (Nightingale, A)

CLASSICS HISTORY STANFORD INTRODUCTORY SEMINARS

CLASSHIS 37N. The Early Roman Emperors: HIstory, Biography, and Fiction

(F,Sem. Same as HISTORY 12N.) Stanford Introductory Seminar. Preference to freshmen. The politics, drama, and characters of the period after the fall of the Roman Republic in 49 B.C.E. Issues of liberty and autocracy explored by Roman writers through history and biography. The nature of history writing, how expectations about literary genres shape the materials, the line between biography and fiction,and senatorial ideology of liberty. Readings include: Tacitus' Annals, Suetonius' Lives of the Caesers, and Robert Graves' I Claudius and episodes from the BBC series of the same title. GER:DB-Hum

3 units, Aut (Saller, R)

COMMUNICATION STANFORD INTRODUCTORY SEMINARS

COMM 118Q. Theories of Film Practice

(S,Sem) 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)

COMPARATIVE LITERATURE STANFORD INTRODUCTORY SEMINARS

COMPLIT 10N. Shakespeare and Performance in a Global Context

(F,Sem) 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

(S,Sem) 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 (Parker, P)

COMPLIT 21N. First Person Singular

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. How first person narrative has been used across Western literature from antiquity to the present, in works including nonfictional autobiography, records of travel and testimonial, novels, and lyric poetry. Nonfictional readings may include Augustine, Rousseau, Cook, Equiano, and Freud; novels by Montesquieu, Mary Shelley, Conrad, and Levi; and poems by Rimbaud and Rilke. The use of the first-person in online media. GER:DB-Hum

5 units, Spr (Cohen, M)

COMPLIT 41Q. Ethnicity and Literature

(S,Sem) 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

3-5 units, Aut (Palumbo-Liu, D)

COMPLIT 54N. Reading in Common

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The personal and social functions of literary narrative. How do works of literature serve as ways for people to communicate with each other? Are fiction readers part of a broad, transhistorical community of readers? How does that membership shape the way authors write their own life stories? Writers include: Ruth Ozeki, Ondaatje, Calvino, and Gordimer.

5 units, Spr (Palumbo-Liu, D)

COMPLIT 61Q. Culture and Conflict in Contemporary Europe

(S,Sem Same as GERGEN 61Q.) Stanford Introductory Seminar. Preference to sophomores. Transformation of European culture and identity in the wake of the Cold War, European unification, and the post 9/11 environment. Pressures on transatlantic relationships; anti-Americanism; tensions around national cultural identity due to regional integration and globalization; immigration and the European experience of multiculturalism; and flashpoints of conflict concerning religion, secularization, and antisemitism.

3-5 units, Spr (Berman, R)

COMPARATIVE MEDICINE STANFORD INTRODUCTORY SEMINARS

COMPMED 81N. Comparative Anatomy and Physiology of Mammals

(F,Sem) Stanford Introductory Seminar. Preference to sophomores. Comparative approach to common mammals, laboratory, and domestic species. The unique adaptations of each species in terms of its morphological, anatomical, and behavioral characteristics. How these species interact with human beings and other animals. GER:DB-NatSci

3 units, Win (Bouley, D)

COMPMED 84Q. Globally Emerging Zoonotic Diseases

(S,Sem) 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)

COMPUTER SCIENCE STANFORD INTRODUCTORY SEMINARS

CS 21N. Can Machines Know? Can Machines Feel?
(F,Sem) 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, Aut (Shoham, Y)

CS 45N. Computers and Photography: From Capture to Sharing
(F,Sem) 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.
3 units, Aut (Garcia-Molina, H)

CS 48N. The Science of Art
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The interwoven histories of science and Western art from the Renaissance to the 19th century. Emphasis is on the revolutions in science and mathematics that inspired parallel revolutions in the visual arts such as Brunelleschi's invention of linear perspective, Newton's discoveries in geometric optics, and the theories of color vision proposed by Goethe, Young, and Helmholtz. The scientific principles behind image making including digital image synthesis and computer graphics. No programming experience required. GER:DB-EngrAppSci
3 units, Win (Levoy, M)

CS 51N. Visionaries in Computer Science
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. How visionaries anticipated the future; how could they see what their contemporaries did not? How can others strive for comparable achievements? The insights of Alan Turing, Vannevar Bush, Richard Licklider, Ted Nelson, Morton Heilig, Ivan Sutherland, Douglas Engelbart, Alan Kay, Frederick Brooks, and others.
3 units, Spr (Koltun, V)

CS 73N. Business on the Information Highways
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The capabilities of the Internet and its services. Writing for the web. The effect on commerce, education, government, and health care. Technical and business alternatives. Who is hurt and who benefits from the changes? Participants develop web publications.
3 units, Spr (Wiederhold, G; Barr, A; Tessler, S)

CS 74N. Digital Dilemmas
(F,Sem) 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. Focus is on technology in elections including topics such as voter registration databases, and electronic and Internet voting. GER:DB-EngrAppSci
3 units, Aut (Dill, D)

DRAMA STANFORD INTRODUCTORY SEMINARS

DRAMA 11N. Dramatic Tensions: Theater and the Marketplace
(F,Sem) 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
4 units, Aut (Freed, A)

DRAMA 12N. Antigone: From Ancient Democracy to Contemporary Dissent
(F,Sem Same as CLASSGEN 6N.) Stanford Introductory Seminar. 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
4 units, Win (Rehm, R)

DRAMA 14N. Shakespeare from Stage to Screen
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The texts, stage practices, and filmic transformations for Shakespearean plays, including Henry V, Hamlet, Midsummer Night's Dream, and Macbeth. Close readings of texts and films; the relationship of film technologies to the texts in the production of political and social space; and the cultural assumptions carried by images and characters. GER:DB-Hum
4 units, Win (Rayner, A)

DRAMA 16N. Beauty or the Beast? Kitsch and Contemporary Culture
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. What kind of esthetic experience does kitsch describe? Is it a matter of taste? Kitsch through disciplines such as visual arts, theater, literature, music, advertising, fashion, celebrity culture, and food. GER:DB-Hum
4 units, Spr (Jakovljevic, B)

DRAMA 17N. Salt of the Earth: The Docudrama in América
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Docudrama as a form of dramatic writing which provides a social critique of current or historical events through creative documentation and dramatization. Sources include Chicana/o and Latina/o texts, Brecht, Teatro Campesino, and Culture Clash. Students produce a short docudrama. GER:DB-Hum, EC-AmerCul
3 units, Win (Moraga, C)

DRAMA 180Q. Noam Chomsky: The Drama of Resistance
(S,Sem) 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 units, Win (Rehm, R)

DRAMA 184Q. Devised Theater Project
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Students create material through writing and performance exercises. Research; storyline and dramatic structure; preparation of the performance space, props, and costume pieces; and rehearse and performance. Guest professionals.
3 units, Win (Weber, C)

DRAMA 187Q. The Stage in Dialogue with History
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The practice and ideological positions of European and American theater from the end of WW II to the implosion of the Soviet empire as seen in major playwrights and practitioners who shaped the European theater. Focus is on how plays and their staging responded to and tried to influence history. GER:DB-Hum
3 units, Aut (Weber, C)

DRAMA 189Q. Mapping and Wrapping the Body
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The concepts behind gender boundaries and clothing systems. GER:DB-Hum
3 units, Aut (Eddelman, W)

EARTH SYSTEMS STANFORD INTRODUCTORY SEMINARS

EARTHSYS 45N. Energy Issues Confronting the World
(F,Sem) Stanford Introductory Seminar. Preference to freshman. Geologic, economic, and policy issues shaping energy use and contrasting human perceptions of energy security. Topics include

discourse of resources, history and future of fossil fuels, curse of oil, global climate change, adaptation versus mitigation, relationship between wealth and energy, demand and strategies for efficiency and conservation, alternative energy prospects, geopolitics of energy trading, and energy flow among countries of the world. Game simulation, outside readings, class brainstorming, and student oral presentations on country energy profiles. GER:DB-NatSci

3 units, Win (Howell, D)

ECONOMICS STANFORD INTRODUCTORY SEMINARS

ECON 11N. Understanding the Welfare System

(F,Sem) 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

(F,Sem) 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)

ELECTRICAL ENGINEERING STANFORD INTRODUCTORY SEMINARS

EE 10N. How Musical Instruments Work

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Musical instruments as examples of science, engineering, and the interplay between the two. The principles of operation of wind, string, and percussion instruments. Concepts include waves, resonators, sound spectra and the harmonic structure of instruments, engineering design, and the historical co-development of instruments and the science and engineering that makes them possible. Prerequisites: high school math and physics. Recommended: some experience playing a musical instrument. GER:DB-EngrAppSci

3 units, Spr (Miller, D)

EE 14N. Things about Stuff

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Most engineering curricula present truncated, linear histories of technology, but the stories behind disruptive inventions such as the telegraph, telephone, wireless, television, transistor, and chip are as important as the inventions themselves. How these stories elucidate broadly applicable scientific principles. Focus is on studying consumer devices; optional projects to build devices including semiconductors made from pocket change. Students may propose topics of interest to them. GER:DB-EngrAppSci

3 units, Aut (Lee, T)

EE 17N. Engineering the Micro and Nano Worlds: From Chips to Genes

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Hands-on operation of microscopes and micro-fabrication tools in the Stanford Nanofabrication Facility, field trips to local companies engaged in the applications of micro/nanotechnologies, and guest speakers in microelectronics, MEMS, and bio- and nanotechnology. Prerequisites: high-school physics. GER:DB-EngrAppSci

3 units, Spr (Pease, R; Maluf, N)

EE 21N. What is Nanotechnology?

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Possibilities and impossibilities of nanotechnology. Sources include Feynman's There's Plenty of Room at the Bottom, Drexler's Engines of Creation: The Coming Era of Nanotechnology, and Crichton's Prey. Assumptions and predictions of these classic works; what nano machinery may do; scenarios of a technology that may go astray. Prerequisites: high school math, physics and chemistry. GER:DB-EngrAppSci

3 units, Aut (Wong, P)

EE 23N. Imaging: From the Atom to the Universe

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Forms of imaging including human and animal vision systems, atomic force microscope, microscope, digital camera, holography and three-dimensional imaging, telescope, synthetic aperture radar imaging, nuclear magnetic imaging, sonar and gravitational wave imaging, and the Hubble Space telescope. Physical principles and exposure to real imaging devices and systems. GER:DB-EngrAppSci

3 units, Spr (Hesselink, L)

EE 60N. Man versus Nature: Coping with Disasters Using Space Technology

(F,Sem Same as GEOPHYS 60N.) Stanford Introductory Seminar. Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. GER:DB-EngrAppSci

4 units, Aut (Zebker, H)

ENGINEERING STANFORD INTRODUCTORY SEMINARS

ENGR 159Q. Japanese Companies and Japanese Society

(S,Sem Same as MATSCI 159Q.) Stanford Introductory Seminar. 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 STANFORD INTRODUCTORY SEMINARS

ENGLISH 14Q. Tis All in Pieces: John Donne and the Early Modern World

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Situating Donne's work within his historical and cultural milieu; how his writing reflects changes on the threshold of the modern era. The historical, scientific, and cultural milieu of the early modern world. Related developments in mathematical perspective and early modern art. The influence of his dramatic realism on modern poets such as Browning, Eliot, and Rich, and composers such as Benjamin Britten and Bob Dylan. GER:DB-Hum

4-5 units, Win (Brooks, H)

ENGLISH 51N. Drama Queens: Powerful Women on Stage

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Eight strong women at the center of works of Greek, Shakespearean, and modern theater in the context of social misogyny. How they enact the social and spiritual visions of their creators. Sources include film performances. Students perform simple scene work. No acting experience required. GER:DB-Hum

3 units, Aut (Friedlander, L)

ENGLISH 52N. Ten Top Books

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The books most frequently taught in U.S. English departments including classics by Nathaniel Hawthorne and F. Scott Fitzgerald and recent works by minority writers such as Toni Morrison and Maxine Hong Kingston. Cultural and historical contexts, and the aesthetic and social factors that canonize these literary supertexts. GER:DB-Hum

3 units, Win (Jones, G)

ENGLISH 53N. Aesthetic Taste and Gastronomy

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. A sampling of aesthetics and gastronomy as defined by 18th-century

British essayists and their heirs from England and France. Focus is on the development of middle class taste, figurative as well as food-oriented, and manners, snobbery, and sensibility. GER:DB-Hum

3 units, Win (Gigante, D)

ENGLISH 65N. Contemporary Women Fiction Writers
(F,Sem) 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 69Q. Sources of Global Challenges Today, Possibilities for Global Solutions: A Literary Exploration
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Concerns central to literary study, comparative study in race and ethnicity, and African and African American Studies as expressed in fiction from Africa, the Caribbean, the U.S., and Hawai'i. Issues include: relations between the West and the Muslim world; class and race in the U.S.; the shift of world populations from rural society to the metropolis; international immigration and refugee situations; and how women's lives are impacted by society, and how they shape and change it. Opportunities for dialogue with members of local ethnic and religious communities. GER:DB-Hum

3-5 units, Spr (Drake, S)

ENGLISH 70N. Shakespeare on Film
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Premises of film criticism. Films include *A Midsummer Night's Dream* directed by Max Reinhardt and Peter Hall; *Romeo and Juliet* by Franco Zefirelli and Baz Luhrman; *Henry V* by Laurence Olivier and Kenneth Branagh; and *Hamlet* by Sven Gade, Olivier, Grigori Kozintsev, Zefirelli, Branagh, and Michael Almereyda. GER:DB-Hum

3 units, Aut (Riggs, D)

ENGLISH 77N. Living in the Past: Italy in the Anglo-American Imagination
(F,Sem) 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, Aut (Evans, M)

ENGLISH 82Q. Shakespeare's Plays
(S,Sem) 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, Spr (Rebholz, R)

ENGLISH 85Q. The Brontës: A Victorian Family
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The Brontë children's stories of personal power and political intrigue, based on the the news of the period. Readings include Charlotte Brontë's *Jane Eyre*, Emily Brontë's *Wuthering Heights*, and Anne Brontë's *Agnes Grey* focusing on the tedium, aspirations, and frustrations of these gifted women. Historical, cultural, and autobiographical questions in these novels, the juvenilia, and a representative later work. Prerequisite: PWR 1. GER:DB-Hum

3-4 units, Win (Paulson, L)

ENGLISH 87N. The Graphic Novel: Word, Image, Sound, Silence
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The evolution of funnies to comics and graphic novels. How definitions and representations of this genre have changed over the last century. The controversy over the status of the graphic novel. GER:DB-Hum

5 units, Win (Lunsford, A)

ENVIRONMENTAL EARTH SYSTEM SCIENCE STANFORD INTRODUCTORY SEMINARS

EESS 39N. The Carbon Cycle: Reducing Your Impact
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Changes in the long- and short-term carbon cycle and global climate through the burning of fossil fuels since the Industrial Revolution. How people can shrink their carbon footprints. Long-term sources and sinks of carbon and how they are controlled by tectonics and short-term sources and sinks and the interaction between the biosphere and ocean. How people can shrink their carbon footprints. Held at the Stanford Community Farm. GER:DB-NatSci

3 units, Spr (Chamberlain, P)

EESS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough
(F,Sem) Stanford Introductory Seminar. 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)

FEMINIST STUDIES STANFORD INTRODUCTORY SEMINARS

FEMST 188N. Imagining Women: Writers in Print and in Person
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Contemporary literature through recent texts and conversations with the authors including Stanford faculty and visiting writers. Analytical and creative writing. Writing experience not necessary.Preference to sophomores. Contemporary literature through recent texts and conversations with the authors including Stanford faculty and visiting writers. Analytical and creative writing. Prerequisite: PWR 1. GER:DB-Hum

4-5 units, Win (Miner, V)

FEMST 191Q. Writing Women's Lives
(F,Dial) 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)

FRENCH GENERAL STANFORD INTRODUCTORY SEMINARS

FRENGEN 45N. American Writers in 20th-Century Paris
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. A crosscultural inquiry into Paris as a part of American culture, a myth, a longing, and source of inspiration. Role of artistic movements (Cubism, Surrealism, Existentialism) and cultural institutions such as the cafés, libraries, 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. Readings: Gertrude Stein, Hemingway, Fitzgerald, Anaïs Nin, and Baldwin. In English. GER:DB-Hum

3-4 units, Win (Alduy, C)

FRENGEN 190Q. Parisian Cultures of the 19th and Early 20th Centuries
(S,Sem) 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, Spr (Bertrand, M)

GENETICS STANFORD INTRODUCTORY SEMINARS

GENE 109Q. Genomics: A Technical and Cultural Revolution
(S,Sem Same as BIOMEDIN 109Q.) Stanford Introductory Seminar. Preference to sophomores. For non-science majors. 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)

GEOLOGICAL AND ENVIRONMENTAL SCIENCES STANFORD INTRODUCTORY SEMINARS

GES 39N. Forensic Geoscience: Stanford CSI
(F,Sem) 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, Spr (Maher, K)

GES 40N. Diamonds
(F,Sem) 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
(S,Sem) Stanford Introductory Seminar. 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
(S,Sem) 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)

GEOPHYSICS STANFORD INTRODUCTORY SEMINARS

GEOPHYS 20Q. Predicting Volcanic Eruptions
(F,Dial) Stanford Introductory Seminar. Preference to sophomores. The physics and chemistry of volcanic processes and modern methods of volcano monitoring. Volcanoes as manifestations of the Earth's internal energy and hazards to society. How earth scientists better forecast eruptive activity by monitoring seismic activity, bulging of the ground surface, and the discharge of volcanic gases, and by studying deposits from past eruptions. Focus is on the interface between scientists and policy makers and the challenges of decision making with incomplete information. Field trip to Mt. St. Helens, site of the 1980 eruption.
3 units, Spr (Segall, P), alternate years, not given next year

GEOPHYS 60N. Man versus Nature: Coping with Disasters Using Space Technology
(F,Sem Same as EE 60N.) Stanford Introductory Seminar. Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. GER:DB-EngrAppSci
4 units, Aut (Zebker, H)

GERMAN GENERAL STANFORD INTRODUCTORY SEMINARS

GERGEN 61Q. Culture and Conflict in Contemporary Europe
(S,Sem Same as COMPLIT 61Q.) Stanford Introductory Seminar. Preference to sophomores. Transformation of European culture and identity in the wake of the Cold War, European unification, and the post 9/11 environment. Pressures on transatlantic relationships; anti-Americanism; tensions around national cultural identity due to regional integration and globalization; immigration and the European experience of multiculturalism; and flashpoints of conflict concerning religion, secularization, and antisemitism.
3-5 units, Spr (Berman, R)

GERMAN LITERATURE STANFORD INTRODUCTORY SEMINARS

GERLIT 16N. Music, Myth, and Modernity: Wagner's Ring Cycle and Tolkien's Lord of the Rings
(F,Sem Same as MUSIC 16N.) Stanford Introductory Seminar. Preference to freshmen. Roots of Wagner's operatic cycle and Tolkien's epic trilogy in a common core of Norse, Germanic, and Anglo-Saxon mythology. The role of musical motive and characterization in Wagner's music dramas and the film version of Tolkien's trilogy. Music as a key element in the psychological, political, and cultural revision of ancient myth in modern opera and film. GER:DB-Hum, EC-GlobalCom
3 units, Spr (Grey, T)

GRADUATE SCHOOL OF BUSINESS STANFORD INTRODUCTORY SEMINARS

GSBGEN 111Q. Seminar in Entrepreneurial Communication
(S,Sem) Stanford Introductory Seminar. College campuses have been the incubators for thousands of new business ventures. What makes the difference between a successful entrepreneur and an initial failure: often not the quality of the idea, but rather the ability of the entrepreneurs to successfully communicate their vision to potential investors, employees, and customers. Successful and failed entrepreneurial communication. Basics of persuasive oral and written communication.
3 units, Spr (Schramm, J)

HEALTH RESEARCH AND POLICY STANFORD INTRODUCTORY SEMINARS

HRP 89Q. Introduction to Crosscultural Issues in Medicine
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Crosscultural issues that impact health care delivery such as ethnicity, immigration, language barriers, and service expectations. Focus is on culturally unique and non-English speaking populations and developing interpersonal and communication skills with diverse ethnic groups. GER:EC-AmerCul
3 units, Win (Corso, I)

HISTORY STANFORD INTRODUCTORY SEMINARS

HISTORY 12N. The Early Roman Emperors: HIstory, Biography, and Fiction
(F,Sem Same as CLASSHIS 37N.) Stanford Introductory Seminar. Preference to freshmen. The politics, drama, and characters of the period after the fall of the Roman Republic in 49 B.C.E. Issues of liberty and autocracy explored by Roman writers through history and biography. The nature of history writing, how expectations about literary genres shape the materials, the line between biography and fiction,and senatorial ideology of liberty. Readings include: Tacitus' Annals, Suetonius' Lives of the Caesers, and Robert Graves' I Claudius and episodes from the BBC series of the same title. GER:DB-Hum
3 units, Aut (Saller, R)

HISTORY 20Q. Russia in the Early Modern European Imagination
(S,Sem) 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, Spr (Kollmann, N)

HISTORY 22N. Images and Practices of Violence in Early Modern Russian Art and Law

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Myths and realities about violence in 15th-17th century Russia. While Muscovy is often considered a brutal and violent state, political ideology stressed piety, judicial practice routinely mitigated sentences, and artistic imagery never depicted graphic violence. Theories of iconography, ritual, and imagery and their reception by beholders; judicial and political practice; political ideology; social behavior; and comparisons to early modern Europe in art, violence, and the law. GER:DB-Hum

5 units, Spr (Kollmann, N)

HISTORY 34N. The European Witch Hunts

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Witch trials, early modern demonology, and historians' interpretations. What was it about early modernity that fueled witch hunting? Forms of the supernatural in history, whether from the ordered world of organized religion, or frightening, uncontrolled, and dangerous. The idea of witchcraft; the fear that some people harm others supernaturally. Reformation era witch hunts conducted in a period of state building and scientific discovery and in violation of extant laws and procedures. GER:DB-Hum

4 units, Win (Stokes, L)

HISTORY 36N. Gay Autobiography

(F,Sem) 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 38N. The Body

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Cultural and social meanings of the body. How medicine, media, law, and culture construct changing ideals of the body. How to apply historical and feminist analyses to understand change and the difference that gender makes in the social and cultural construction of the body. Emphasis is on shifting historical ideals for female and male bodies, and the changing importance of body image in popular culture. Readings include girls' diaries, women's sports, masculinity in the media, sexual violence, and performing the body. GER:DB-Hum, EC-Gender

5 units, Spr (Freedman, E)

HISTORY 44N. The History of Women and Gender in Science, Medicine, and Engineering

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Women's participation in science; women as objects of scientific research; gender in the culture of the sciences; and how gender analysis has changed science theory and practice. GER:DB-Hum, EC-Gender

4 units, Win (Schiebinger, L)

HISTORY 46N. Science and Magic

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Key episodes in the intertwined histories of natural science and magic from the early modern period, and questions these episodes raise regarding the nature of scientific knowledge, its public image, and the modern role of magic in society. GER:DB-Hum

5 units, Win (Riskin, J)

HISTORY 48Q. South Africa: Contested Transitions

(S,Sem) 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

3 units, Win (Samoff, J)

HISTORY 52N. The Harlem Renaissance

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The literary and artistic movement of the Harlem Renaissance in the context of broader transformations in American and African American culture in the 20s. Novels, poetry, plays, and critical essays by writers such as Langston Hughes, Zora Neale Hurston, Nella Larsen, Claude McKay, Wallace Thurman, and Alain Locke. The work of contemporary musicians, dancers, and visual artists. GER:DB-Hum

5 units, Win (Campbell, J)

HISTORY 54N. African American Women's Lives

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The everyday lives of African American women in 19th- and 20th-century America in comparative context of histories of European, Hispanic, Asian, and Native American women. Primary sources including personal journals, memoirs, music, literature, and film, and historical texts. Topics include slavery and emancipation, labor and leisure, consumer culture, social activism, changing gender roles, and the politics of sexuality. GER:DB-Hum

4-5 units, Aut (Hobbs, A)

HISTORY 90Q. Buddhist Political and Social Theory

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Historical and textual roots, emphasizing Tibetan, Bhutanese, and Thai Buddhism. Society and polity in Buddhist thought, Buddhist spiritual, social, and political practice. The state, sovereignty, and the individual and society. Law. Buddhist economic theory, Gross National Happiness, and sustainable economy. The Buddhist critique of neoliberalism. GER:DB-SocSci, EC-GlobalCom

4-5 units, Win (Mancall, M)

HISTORY 95N. Mapping the World: Cartography and the Modern Imagination

(F,Sem) 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, Aut (Wigen, K)

HUMAN BIOLOGY STANFORD INTRODUCTORY SEMINARS

HUMBIO 84Q. Social Justice, Responsibility, Health

(S,Sem) 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.

4 units, Aut (Heaney, C)

HUMBIO 86Q. Love as a Force for Social Change

(S,Sem) 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.

3 units, Win (Murray, A)

HUMBIO 87Q. Women and Aging

(S,Sem Same as MED 87Q.) Stanford Introductory Seminar. Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. GER:EC-Gender

5 units, Win (Winograd, C)

HUMBIO 91Q. Neuroethology: The Neural Control of Behavior
(S,Sem) 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 97Q. Sport, Exercise, and Health: Exploring Sports Medicine
(S,Sem Same as ORTHO 97Q.) Stanford Introductory Seminar. 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), Spr (Matheson, G)

HUMBIO 99Q. Becoming a Doctor: Readings from Medical School, Medical Training, Medical Practice
(S,Sem) 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)

INTRODUCTION TO THE HUMANITIES STANFORD INTRODUCTORY SEMINARS

IHUM 58Q. Technology and Utopia: Refining the Vision
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Students read utopian literature more broadly than in IHUM 58 including texts such as Edward Bellamy's Looking Backward and texts that offer greater diversity of vision. The nature of utopia. Students develop their own imaginative visions of the ideal society. Prerequisite: IHUM 58.
3 units, Aut (Robinson, O; Roberts, E)

ITALIAN GENERAL STANFORD INTRODUCTORY SEMINARS

ITALGEN 41N. Imagining Italy
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Literary responses to Italy by writers in English during the past hundred years and how they continue to constuct myths of Italy. How these myths have been transformed into commodities in consumer culture, making Italy a profitable fiction. Authors include Hawthorne, Howells, James, Wharton, Forster, Unsworth, Hellenga, and Maves. GER:DB-Hum
3-4 units, Spr (Springer, C)

JAPANESE GENERAL STANFORD INTRODUCTORY SEMINARS

JAPANGEN 71N. Language and Gender in Japan: Myths and Reality
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Ideology and practice of gender in the Japanese society as reflected in and created by stylistic choices in the Japanese language. Past and present speech styles of women and men, speech situations, age, class, identities of the individual speakers and their relationships with others. How belief and reality are refracted through mass media and fictional representations. Comparisons with similar phenomena in other cultures. GER:DB-SocSci, EC-Gender
4 units, Spr (Matsumoto, Y)

LAW NONPROFRSSIONAL STANFORD INTRODUCTORY SEMINARS

LAWGEN 110Q. Criminal Justice and the Criminal Courts
(S,Sem) Stanford Introductory Seminar. Focus is on the structures and theories at play in the criminal court system, emphasizing court procedures, structures, constitutional guarantees, and the trial process. The roles of individual agents, including the police, prosecutors, defense attorneys, judges, probation officers, and corrections officials.
3 units, Spr (Dansky, K)

LINGUISTICS STANFORD INTRODUCTORY SEMINARS

LINGUIST 5N. What's Your Accent? Investigations in Acoustic Phonetics
(F,Sem) 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, Aut (Sumner, M)

LINGUIST 62N. The Language of Food
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The relationship between food and language around the globe. The vocabulary of food and prepared dishes, and crosslinguistic similarities and differences, historical origins, forms and meanings, and relationship to cultural and social variables. The structure of cuisines viewed as meta-languages with their own vocabularies and grammatical structure. The language of menus; their historical development and crosslinguistic differences.
3 units, Aut (Jurafsky, D)

LINGUIST 63N. Translation
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. 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)

MANAGEMENT SCIENCE AND ENGINEERING STANFORD INTRODUCTORY SEMINARS

MS&E 92Q. International Environmental Policy
(S,Sem) 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, Terrorism, and Energy
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. What are nuclear weapons and what do they do? Why do some nations want them? What are the risks of nuclear terrorism? What is radioactivity? What role does nuclear power play? Can it help with global warming? Emphasis is on policy options in the light of changes in the world. Recommended: a course in international relations, engineering, or physical science. GER:DB-EngrAppSci, DB-EngrAppSci
3 units, Spr (Hecker, S)

MATERIALS SCIENCE AND ENGINEERING STANFORD INTRODUCTORY SEMINARS

MATSCI 70N. Building the Future: Invention and Innovation with Engineering Materials
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The technological importance of materials in human civilization is captured in historical names such as the Stone, Bronze, and Iron Ages. The present Information Age could rightly be called the

Silicon Age. The pivotal roles of materials in the development of new technologies. Quantitative problem sets, field trips, and formal presentations of small-group projects. GER:DB-EngrAppSci

5 units, Spr (Bravman, J)

MATSCI 81N. Bioengineering Materials to Heal the Body
(F,Sem) 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
(S,Sem Same as ENGR 159Q.) Stanford Introductory Seminar. 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)

MATHEMATICS STANFORD INTRODUCTORY SEMINARS

MATH 80Q. Capillary Surfaces: Explored and Unexplored Territory
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Capillary surfaces: the interfaces between fluids that are adjacent to each other and do not mix. Recently discovered phenomena, predicted mathematically and subsequently confirmed by experiments, some done in space shuttles. Interested students may participate in ongoing investigations with affinity between mathematics and physics.

3 units, Win (Finn, R)

MATH 87Q. Mathematics of Knots, Braids, Links, and Tangles
(S,Sem) 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, Spr (Wieczorek, W)

MATH 88Q. The Mathematics of the Rubik's Cube
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Group theory through topics that can be illustrated with the Rubik's cube: subgroups, homomorphisms and quotient groups, the symmetric and alternating groups, conjugation, commutators, and Sylow subgroups.

3 units, Win (Bump, D)

MECHANICAL ENGINEERING STANFORD INTRODUCTORY SEMINARS

ME 10N. Form and Function of Animal Skeletons
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The biomechanics and mechanobiology of the musculoskeletal system in human beings and other vertebrates on the level of the whole organism, organ systems, tissues, and cell biology. Field trips to labs. GER:DB-EngrAppSci

3 units, Win (Carter, D)

ME 17N. Robotics Imitating Nature
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The dream of constructing robots that duplicate the functional abilities of humans and/or other animals has been promulgated primarily by science fiction writers. But biological systems provide models for the designers of robots. Building electromechanical devices that perform locomotory and sensing functions similar to those of an animal as a way of learning about how biological systems function. Walking and running machines, and the problem of giving a robot the capability to respond to its environment. GER:DB-EngrAppSci

3 units, Spr (Waldron, K)

ME 18Q. Teamology: Creative Teams and Individual Development
(S,Sem) 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
(F,Sem) 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
(F,Sem) 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
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Techniques designers use to create innovative solutions across domains. Project-based. Emphasis is on 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. The pleasures of creative design and hands-on development of tangible solutions.

3 units, Aut (Banerjee, S)

MEDICINE STANFORD INTRODUCTORY SEMINARS

MED 70Q. Cancer and the Immune System
(S,Sem) 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, Spr (Negrin, R)

MED 83Q. Ethical, Legal, and Social Dimensions of Stem Cell Research
(S,Sem) 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
(F,Dial) Stanford Introductory Seminar. 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, Win (McConnell, M)

MED 87Q. Women and Aging
(S,Sem Same as HUMBIO 87Q.) Stanford Introductory Seminar. Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. GER:EC-Gender

5 units, Win (Winograd, C)

MED 88Q. Dilemmas in Current Medical Practice
(S,Sem) 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? Optional observation of instructors in their medical practices.

3 units, Aut (Croke, J; Jones, H)

MED 93Q. The AIDS Epidemic: Biology, Behavior, and Global Responses
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. How the discovery of the causative agent and the modes of transmission of HIV fueled a quest for prevention, treatments, and a vaccine. Discoveries in biology, biotechnology, epidemiology, and medicine during the last 20 years. Hypotheses about the origins of HIV as a human disease; the spread of AIDS and HIV; social, political, and economic consequences of the epidemic; and national and global responses.

3 units, Aut (Katzenstein, D)

MED 108Q. Human Rights and Health
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. History of human-rights law. Topics such as: the health status of refugees and internally displaced persons; child labor; trafficking in women and children; torture; poverty, the environment, and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. International conventions on human rights as background for social and political changes that could improve the health of groups and individuals. Optional opportunities to observe at sites where human rights and health are issues.

3 units, Win (Laws, A)

MOLECULAR AND CELLULAR PHYSIOLOGY STANFORD INTRODUCTORY SEMINARS

MCP 100Q. The Hippocampus as a Window to the Mind
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Electrical physiology of the brain using the hippocampus as a model system. The seminar builds from basic anatomical and electrical principles of brain structure and function, through the electrical properties of individual neurons and simple neuronal circuits, to the nature of behaviors that emerge from these more basic properties. Also discusses other brain regions where the hippocampal model provides insight into specific neuronal functions. Culminates in a discussion of neuronal disorders such as epilepsy, drug addiction, and obsessive-compulsive disorder that can be better understood on a basis of knowledge of the hippocampal model.

3 units, Win (Madison, V)

MUSIC STANFORD INTRODUCTORY SEMINARS

MUSIC 13Q. Classical Music and Politics: Western Music in Modern China
(S,Sem) 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 14N. Women Making Music
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Women's musical activities across times and cultures; how ideas about gender influence the creation, performance, and perception of music. GER:DB-Hum, EC-Gender

3 units, Aut (Hadlock, H)

MUSIC 16N. Music, Myth, and Modernity: Wagner's *Ring* Cycle and Tolkien's *Lord of the Rings*
(F,Sem Same as GERLIT 16N.) Stanford Introductory Seminar. Preference to freshmen. Roots of Wagner's operatic cycle and Tolkien's epic trilogy in a common core of Norse, Germanic, and Anglo-Saxon mythology. The role of musical motive and characterization in Wagner's music dramas and the film version of Tolkien's trilogy. Music as a key element in the psychological, political, and cultural revision of ancient myth in modern opera and film. GER:DB-Hum, EC-GlobalCom

3 units, Spr (Grey, T)

MUSIC 17N. The Operas of Mozart
(F,Sem) 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
(S,Sem) 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 37N. Ki ho'alu: The New Renaissance of a Hawaiian Musical Tradition
(F,Sem) Stanford Introductory Seminar. Preference to freshman. Developed in the Hawaiian Islands during the 1830s, ki ho'alu, or Hawaiian slack key guitar, is an art form experiencing newfound popularity coinciding with the growth of political activism in Hawaiian culture. The musical, cultural, historical, and political perspectives of Hawaiian music and ki ho'alu, through hands-on experience, readings, discussion, and workshops. Hawaiian music and history and relationships among performance, cultural expression, community, and identity. GER:DB-Hum, EC-AmerCul

3 units, Aut (Sano, S)

MUSIC 38N. Singing Early Music
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. 15th- and 16th-century musical repertories and their contexts; performance practice. GER:DB-Hum

3 units, Spr (Rodin, J)

NEUROLOGY AND NEUROLOGICAL SCIENCES STANFORD INTRODUCTORY SEMINARS

NENS 67N. Intracellular Trafficking and Neurodegeneration
(F,Sem) 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)

NEUROSURGERY STANFORD INTRODUCTORY SEMINARS

NSUR 70Q. Experimental Stroke
(F,Dial) 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, Win (Zhao, H)

ORTHOPEDIC SURGERY STANFORD INTRODUCTORY SEMINARS

ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine

(S,Sem Same as HUMBIO 97Q.) Stanford Introductory Seminar. 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), Spr (Matheson, G)

PATHOLOGY STANFORD INTRODUCTORY SEMINARS

PATH 103Q. Lymphocyte Migration

(F,Dial) 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, Win (Michie, S)

PATH 105Q. Final Analysis: The Autopsy as a Tool of Medical Inquiry

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Based on review of patient medical histories and examination of formalin-fixed and unfixed tissues from autopsy. Student-directed problem-solving; students develop learning objectives for each case, and present findings. The effect of disease on normal structure and function, ethics of patient care, allocation of medical resources, efficiency of therapy, and medical error. Prerequisite: hepatitis-B vaccination; free vaccinations during the winter for accepted students.

3 units, Spr (Regula, D)

PEDIATRICS STANFORD INTRODUCTORY SEMINARS

PEDS 111Q. Issues of Race and Ethnicity in the Health of Children

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Medicine and pediatrics from a public-health, evidence-based perspective. How research methods unmask health issues for at-risk racial and ethnic groups of children. Determinants of health with regard to race and ethnicity and ideas for changes in public policy. Students identify an area of interest and proposed intervention.

3-4 units, Aut (Burgos, A)

PHILOSOPHY STANFORD INTRODUCTORY SEMINARS

PHIL 11N. Skepticism

(F,Sem) 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, Win (De Pierris, G)

PHIL 13N. Freedom of the Will and Moral Responsibility

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Historical and contemporary views on this central philosophical problem: in order to be morally responsible, do people have to have free will? If so, then would the premise that all events are causally determined make such freedom impossible?

3 units, Spr (Schapiro, T)

PHIL 14N. Belief

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Is there anything wrong with believing something without evidence? Is it possible? The nature and ethics of belief, and belief's relation to evidence and truth. How much control do believers have over their belief? GER:DB-Hum

3 units, Win (Lawlor, K)

PHIL 15N. Freedom, Community, and Morality

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Does the freedom of the individual conflict with the demands of human community and morality? Or, as some philosophers have maintained, does the freedom of the individual find its highest expression in a moral community of other human beings? Readings include Camus, Mill, Rousseau, and Kant. GER:DB-Hum, EC-EthicReas

3 units, Aut (Friedman, M)

PHIL 19N. Practical Reasoning

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Practical reasoning aims. Structure of practical reasoning. Practical reasoning as means to ends that are taken as given. Practical reasoning about ends. Practical reasoning concerned with some sort of maximization of some value. Relation between practical reasoning and desire. Relation between practical reasoning and planning. Relation between different views about practical reasoning and different views about morality. Structure of practical reasoning affected by perceptions of subtle features of different situations.

3 units, Win (Bratman, M)

PHIL 41Q. Truth

(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Central issues animating current work in the philosophy of truth. What is truth? What is it about a statement or judgment that makes it true rather than false? Are there any propositions that are neither true nor false? Could truth be relative to individuals or communities? Do people have different notions of truth for different enterprises such as mathematics and ethics? Might truth be a matter of degree? Sources include the instructor's book manuscript and other contemporary writers.

3 units, Aut (Burgess, A)

PHYSICS STANFORD INTRODUCTORY SEMINARS

PHYSICS 11N. The Basic Rules of Nature

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The development by physicists of descriptions of the behavior of matter on microscopic scales and scales characteristic of the Universe as a whole, including quantum mechanics, particle physics, and general relativity. Promising approaches that physicists are using to shed light on remaining mysteries, including string theory and M theory. Discussions are semiquantitative. Prerequisite: high school physics or equivalent. GER:DB-NatSci

3 units, Win (Susskind, L)

PHYSICS 18N. Revolutions in Concepts of the Cosmos

(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The evolution of the concept 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. Enrollment limited to 20 in one section. GER:DB-NatSci

3 units, Win (Roodman, A)

PHYSICS 41N. Mechanics: Insights, Applications, and Advances

(F,Sem) Stanford Introductory Seminar. Preference to freshman. Additional topics for students in PHYSICS 41 such as tidal forces, gyroscopic effects, fractal dimensions, and chaos. Corequisite: 41.

1 unit, Win (Abel, T)

PHYSICS 43N. Understanding Electromagnetic Phenomena
(F,Sem) 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
(F,Sem) 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 consent of instructor.
1 unit, Aut (Susskind, L)

PHYSICS 80N. The Technical Aspects of Photography
(F,Sem) 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 84Q. The Rise of the Machines
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Key experiments in the history of particle physics and astrophysics. Evolution and innovation in detector and accelerator technologies that enabled these experiments. The fundamental structure and interactions of matter. Recommended: some high school or introductory college physics.
3 units, Spr (Schindler, R)

PHYSICS 87N. The Physics of One: Nanoscale Science and Technology
(F,Sem) Stanford Introductory Seminar. 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, Win (Manoharan, H)

POLITICAL SCIENCE STANFORD INTRODUCTORY SEMINARS

POLISCI 12N. Democracy and Inequality in Latin America
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The relationship between inequality, attributable to factors such as education, assets, land tenure and family structure, and the spread of democracy. The role of colonial institutions founded on the extraction of mineral resources and plantation labor relations; the deficit in political institutions that often led to the exclusion of the poor; the lack of rule of law and enforcement of property rights; the slow expansion of educational systems; the links between enfranchisement and literacy requirements; and the role of military coups and the frequent interruption of democratic politics.
5 units, Spr (Diaz-Cayeros, A)

POLISCI 13N. 2008 Presidential Election
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Analytical framework for understanding the U.S. presidential election campaign. Focus is on historical election results, survey data, and experimental data. Concepts from political science, such as party identification and the spatial voting model, and statistics, such as sampling error and survey bias. GER:DB-SocSci
5 units, Aut (Jackman, S)

POLISCI 16N. Politics of Economic Development
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Why are some countries rich and others poor? What explains the policies that governments adopt, and how do those policies affect economic performance? Readings from political science and economics about Latin America and other regions. GER:DB-SocSci
5 units, Win (Tomz, M)

POLISCI 41Q. Building Democracy after Conflict: Iraq in Comparative Perspective
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Problems of post-conflict situations, the conditions for building democracy and how they relate to post-conflict situations, and historical experiences such as Germany and Japan. Iraq as a principal case study.
5 units, Win (Diamond, L)

POLISCI 43N. Oil, Regime Change, and Conflict
(S,Sem) 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, Aut (Karl, T)

PORTUGUESE LANGUAGE STANFORD INTRODUCTORY SEMINARS

PORTLANG 193Q. Spaces and Voices of Brazil through Film
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Introduction to the history, culture, politics, society, and literature of Brazil through films and readings. How the Brazilian film industry reflects its ethnically mixed culture. Forces that have shaped the multicultural reality of modern Brazil and the images projected by the country. In English.
3-4 units, Aut (Wiedemann, L)

PSYCHIATRY STANFORD INTRODUCTORY SEMINARS

PSYC 76Q. Temperament and Creativity in Mood Disorders
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. Western cultural notions of mad geniuses and artistic temperaments. How many individuals who suffer from depression, bipolar disorder, and related problems are nonetheless productively creative. Current psychological and neurobiological research, and assessment of mood, temperament, and creativity. Emphasis is on written and oral communications and multimedia presentations. Write 2. Prerequisite: PWR 1.
4 units, Win (Ketter, T)

PSYC 78Q. Mental Health in Collegiate Athletes
(S,Sem) Stanford Introductory Seminar. Developmental, social, and performance issues in collegiate sports. Topics include transition to Stanford, time management, coping with injuries.
3 units, Win (Steiner, H; McCurdy, M)

PSYC 81Q. Fate of Orphans and Vulnerable Children in Sub Saharan Africa: The HIV/AIDS Pandemic
(S,Sem) Stanford Introductory Seminar. The complicated forces,shaped by geopolitcal history and current events, that frame all social programs, the care of orphans in the context of the AIDS pandemic in particular; history of the care of orphans; developmental effects of deprivation of care and nurturing. Guest speakers.
3 units, Win (Solvason, H; Reicherter, D)

PSYC 111Q. Madness and the Womb: Medical and Artistic Approaches to Mental Illness in Women Through the Ages
(S,Sem) Stanford Introductory Seminar. Historical and current concepts of mental illness in women. Premenstrual dysphoric disorder (PMS), postpartum depression, menopausal mood disorders, and eating disorders. Historical biopsychosocial approach. Readings include women's diaries and advice books, physicians' casebooks, and 19th- and 20th-century medical texts. Guest speakers from art and literature departments. Literary and artistic images, and the social and cultural contexts of these disorders during the last 300 years.
3 units, Aut (Williams, K)

PSYCHOLOGY STANFORD INTRODUCTORY SEMINARS

PSYCH 7Q. Language Acquisition
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. How do infants learn language so effortlessly? Why is it more difficult to learn a language as an adult? Theories of first and second language development and experimental techniques for reading children's minds.
3 units, Aut (Fernald, A)

PSYCH 8N. Life Span Development
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. People continue to change in systematic ways throughout life, but developmental psychology has focused mostly on childhood. Focus is on conceptual models that direct developmental research on adulthood and old age, and the empirical literature concerning developmental changes in cognition, motivation, and emotion. GER:DB-SocSci
3 units, Spr (Carstensen, L)

PSYCH 12N. Self Theories
(F,Sem) 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 16N. Amines and Affect
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. How serotonin, dopamine, and norepinephrine influence people's emotional lives. GER:DB-SocSci
3 units, Spr (Knutson, B)

PSYCH 23N. Aping: Imitation, Control, and the Development of the Human Mind
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The idea that a childhood that prolongs a state of stimulus-bound helplessness beyond that of animals is the price human beings pay for the benefits of shared cognitive structures. How such structures enable social collaboration, language, and the transmission and sharing of knowledge. Sources include psychological data from animals and humans, and recent discoveries in neuroscience.
3 units, Spr (Ramscar, M)

PSYCH 25N. Psychology, Inequality, and the American Dream
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. What role do psychological factors play in perpetrating inequality despite legal prohibitions? How can psychologically wise reforms promote equal opportunity? Topics include school achievement, prejudice and discrimination, social class, and race/ethnicity.
3 units, Aut (Walton, G)

RELIGIOUS STUDIES STANFORD INTRODUCTORY SEMINARS

RELIGST 2N. Theories of Ethics in Classical Islamic Thought
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Premodern Islamic theories of ethics. Homegrown ethical theories and adaptations of Greek thought. How various groups molded their ethical theories to fit their respective theological outlooks, including dialectic theologians, the Greek-inspired philosophers, and the mystics.
4 units, Spr (Sadeghi, B)

RELIGST 3N. Jesus the Jew and the Origins of Christianity
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. 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.
4 units, Aut (Sheehan, T)

RELIGST 7N. The Divine Good: Secular Ethics and Its Discontents
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. What is the good and how does it orient human choice and activity? Is it natural to human beings, or in some way transcendent? How do people come to know it? Why do people often fail to do the good they know? What human capacities and dispositions enable its enactment or attainment? What resources does religion offer for its reparation? Classical and modern readings in moral theory emphasizing the difference that religious aspiration makes for moral reflection. GER:DB-Hum, DB-Hum, EC-EthicReas
4 units, Win (Sockness, B)

RELIGST 9N. Transgression and Transcendence: Exploring Tantric Buddhism
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Vajrayana or Tantric Buddhism, its historical development and primary doctrines, ritual practices, and iconography. Focus is on their transgressive aspects, broader Indian background, and contemporary representations.
4 units, Aut (Harrison, P)

SCIENCE, TECHNOLOGY, AND SOCIETY STANFORD INTRODUCTORY SEMINARS

STS 101Q. Technology in Contemporary Society
(S,Sem) 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)

SLAVIC GENERAL STANFORD INTRODUCTORY SEMINARS

SLAVGEN 13N. Russia and the Russian Experience
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. The political and cultural history of Russia and the Russians: prominent persons, prominent events, and how they shape current attitudes and society. Short works by Russian authors. GER:DB-Hum
3-4 units, Win (Schupbach, R)

SLAVGEN 77Q. Russia's Weird Classic: Nikolai Gogol
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. The work and life of Nikolai Gogol, the eccentric founder of Fantastic Realism. The relationship between romanticism and realism in Russian literature, and between popular Ukranian culture and high Russian and W. European traditions in Gogol's oeuvre. The impact of his work on 20th-century modernist literature, music, and art, including Nabokov, literature of the absurd, Shostakovich, Meyerhold, and Chagall. GER:DB-Hum
3-4 units, Aut (Fleishman, L)

SOCIOLOGY STANFORD INTRODUCTORY SEMINARS

SOC 15N. The Transformation of Socialist Societies
(F,Sem) 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:EC-GlobalCom
3 units, Win (Tuma, N)

SOC 32N. Law in Society
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work. Enrollment limited to 16. GER:DB-SocSci, EC-AmerCul
3 units, Aut (Sandefur, R)

SOC 45Q. Understanding Race and Ethnicity in American Society
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. A brief historical overview of race in America, race and violence, race and socioeconomic wellbeing, and the future of race relations in America. Enrollment limited to 16. GER:DB-SocSci

5 units, Aut (Snipp, C)

SOC 46N. Race, Ethnic, and National Identities: Imagined Communities
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. How new identities are created and legitimated. What does it mean to try on a different identity? National groups and ethnic groups are so large that one individual can know only an infinitesimal fraction of other group members. What explains the seeming coherence of groups? If identities are a product of the imagination, why are people willing to fight and die for them? Enrollment limited to 16. GER:DB-SocSci

3 units, Win (Rosenfeld, M)

SPANISH LITERATURE STANFORD INTRODUCTORY SEMINARS

SPANLIT 102N. Contemporary Latin American Theater
(F,Sem) Stanford Introductory Seminar. Representative playwrights and theater troupes of Spanish speaking Latin America and the Caribbean, emphasizing the 60s and 70s. Topics: representation and politics; theatrical language and poetics; avant gardes and performance; teatro comprometido; psychodrama; influence of Brecht, Artaud, and the Theater of the Absurd. Plays by Emilio Carballido, Sabina Berman, Virgilio Piñera, Jose Triana, René Marqués, Luis Rafael Sánchez, La Candelaria, Yuyachkani, Osvaldo Dragún, Griselda Gambaro, Eduardo Pavlovsky, Egon Wolff. GER:DB-Hum

3-4 units, Aut (Briceno, X)

SPANLIT 105N. Don Quixote
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Topics include: theories of language and the novel; history of early modern Iberia; Muslims in Europe. Close reading technique. Sources include filmed version. GER:DB-Hum

3-4 units, Aut (Barletta, V)

SPANLIT 106N. Contemporary Latin American Novel in Translation
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Representative Latin American novelists who attained international readership after the literary boom. Critical readings and theoretical debates. Topics include: latinoamericanidad, reactions to magical realism, crime and the city, politics of translation, economies of prestige, revisions of dictatorship, relations with contemporary art, representations of class and gender, globalization. Works by Piglia, Vallejo, Aira, Bellatin, Melo, and Bolaño. Film adaptations by Piñevro and Schroeder. GER:DB-Hum

3-4 units, Spr (Hoyos, H)

SPANLIT 109Q. Ten Latin American Protagonists who Changed the World
(S,Sem) Stanford Introductory Seminar. Preference to sohomores. Life stories and portraits of Eva Peron, Frida Kalho, Che Guevara, Michelle Bachelet, sub-comandante Marcos, Lula , Evo Morales, Hugo Chavez, Pele, and Victor Jara. The dynamics of Latin American culture. Sources include documentaries, film, video, news, readings, and archives. GER:DB-Hum

3-4 units, Win (Ruffinelli, J)

SPECIAL LANGUAGE PROGRAM STANFORD INTRODUCTORY SEMINARS

SPECLANG 198Q. Modern Greece in Film and Literature
(S,Sem) 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)

STATISTICS STANFORD INTRODUCTORY SEMINARS

STATS 46N. Experiments in Extrasensory Perception: A Critical Analysis
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Old and new reports of ESP experiments at Stanford and elsewhere. Principles of experimental design, randomization, experimental control and confounding, response modeling, and probabilistic calculation. Design and execution of student ESP experiments, literature reviews, probability calculations, critiques, and oral and written presentations.

3 units, Aut (Switzer, P)

STATS 47N. Breaking the Code?
(F,Sem) Stanford Introductory Seminar. Preference to freshmen. Cryptography and its counterpart, cryptanalysis or code breaking. How the earliest cryptanalysts used statistical tools to decrypt messages by uncovering recurring patterns. How such frequency-analysis tools have been used to analyze biblical texts to produce a Bible code, and to detect genes in the human genome. Overview of codes and ciphers. Statistical tools useful for code breaking. Students use simple computer programs to apply these tools to break codes and explore applications to various kinds of data. GER:DB-Math

3 units, Aut (Holmes, S)

SURGERY STANFORD INTRODUCTORY SEMINARS

SURG 67Q. Health and Medicine in an International World
(S,Sem) Stanford Introductory Seminar. Preference to sophomores.Topics may include the history and international development of Interplast, a nonprofit organization providing free reconstructive surgery for needy children and adults in developing nations; health care at King Faisal Hospital, Saudi Arabia; medical conditions in S. India; eye care in Africa; medical teaching experiences in Dar es Salaam and Haiti; and rural health care in Latin America. The role such activities play in U.S. international relationships.

3 units, Win (Wang, N)

SURG 68Q. Current Concepts in Transplantation
(S,Sem) 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 69Q. It's All in the Head: Understanding Diversity, Development, and Deformities of the Face
(S,Sem) Stanford Introductory Seminar. Preference to sophomores. How the face conveys moods and emotions, and elicits reactions when disease or genetic disorders leave behind disfigurement. New work by evolutionary and molecular biologists concerning how variations in facial form are elicited; how tissues and molecules interact to form the face. How differences in facial anatomy affect an individual's self-perception and their acceptance in our beauty-conscious society.

3-4 units, Win (Helms, J; Brugmann, S)

STATISTICS (STATS) COURSES

For information on undergraduate and graduate programs in the Department of Statistics, see the "Statistics" section of this bulletin.

UNDERGRADUATE COURSES IN STATISTICS

STATS 46N. Experiments in Extrasensory Perception: A Critical Analysis
Stanford Introductory Seminar. Preference to freshmen. Old and new reports of ESP experiments at Stanford and elsewhere. Principles of experimental design, randomization, experimental control and confounding, response modeling, and probabilistic calculation. Design and execution of student ESP experiments, literature reviews, probability calculations, critiques, and oral and written presentations.
3 units, Aut (Switzer, P)

STATS 47N. Breaking the Code?
Stanford Introductory Seminar. Preference to freshmen. Cryptography and its counterpart, cryptanalysis or code breaking. How the earliest cryptanalysts used statistical tools to decrypt messages by uncovering recurring patterns. How such frequency-analysis tools have been used to analyze biblical texts to produce a Bible code, and to detect genes in the human genome. Overview of codes and ciphers. Statistical tools useful for code breaking. Students use simple computer programs to apply these tools to break codes and explore applications to various kinds of data. GER:DB-Math
3 units, Aut (Holmes, S)

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 (Thomas, E), Win (Walther, G), Spr (Boik, J), Sum (Staff)

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 (Staff), Sum (Staff)

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 (Ross, K), Spr (Staff), Sum (Staff)

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. See http://www-stat.stanford.edu/~rag/stat141/. GER:DB-Math
4-5 units, Aut (Boik, J; Rogosa, D)

STATS 166. Computational Biology
(Same as BIOMEDIN 366, STATS 366.) Methods to understand sequence alignments and phylogenetic trees built from molecular data, and general genetic data. Phylogenetic trees, median networks, microarray analysis, Bayesian statistics. Binary labeled trees as combinatorial objects, graphs, and networks. Distances between trees. Multivariate methods (PCA, CA, multidimensional scaling). Combining data, nonparametric inference. Algorithms used: branch and bound, dynamic programming, Markov chain approach to combinatorial optimization (simulated annealing, Markov chain Monte Carlo, approximate counting, exact tests). Software such as Matlab, Phylip, Seq-gen, Arlequin, Puzzle, Splitstree, XGobi.
2-3 units, Spr (Wong, W)

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 (Thomas, E), Win (Walther, G), Spr (Boik, J), Sum (Staff)

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 (Staff)

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, neural networks, association rules, clustering, case based methods, and data visualization.
3 units, Aut (Walther, G)

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 (Zhang, N)

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, Aut (Khalessi, S), Sum (Staff)

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, Spr (Holmes, S)

STATS 209. Understanding Statistical Models and their Social Science Applications

(Same as EDUC 260X, HRP 239.) Statistical modeling in experimental and non-experimental settings, including misconceptions in social science applications such as causal models. Text is Statistical Models: Theory and Practice, by David Freedman. See http://www-stat.stanford.edu/~rag/stat209. Prerequisite: intermediate-level statistical methods including multiple regression, logistic regression, and log-linear models.

3 units, Win (Rogosa, D)

STATS 211. Topics in Quantitative Methods: Meta-Analysis

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.

1-3 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 (Staff)

STATS 214. Randomness in the Physical World

(Same as APPPHYS 214.) Topics include: random numbers, and their generation and application; disordered systems, quenching, and annealing; percolation and fractal structures; universality, the renormalization group, and limit theorems; path integrals, partition functions, and Wiener measure; random matrices; and optical estimation. Prerequisite: introductory course in statistical mechanics or analysis.

3 units, Spr (Diaconis, P; Fisher, D; Holmes, S), alternate years, not given next year

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, Win (Zhang, N)

STATS 217. Introduction to Stochastic Processes

Discrete and continuous time Markov chains, point processes, random walks, branching processes, first passage times, recurrence and transience, stationary distributions. Prerequisite: STATS 116 or consent of instructor.

3 units, Win (Rajaratnam, B), Sum (Staff)

STATS 218. Introduction to Stochastic Processes

Renewal theory, Brownian motion, Gaussian processes, second order processes, martingales.

3 units, Spr (Staff), Sum (Staff)

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 (Ross, K)

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, Aut (Lai, T)

STATS 239B. Workshop in Quantitative Finance

Topics of current interest. May be repeated for credit.

1 unit, Spr (Lai, T)

STATS 240. Statistical Methods in Finance

(SCPD students register for 240P.) Regression analysis and applications to pricing and investment models. Principal components and multivariate analysis. Parametric influence. Financial time series. Estimation and modeling of volatilities. Statistical methods for portfolio management. Hands-on experience with financial data.

3-4 units, Aut (Lai, T)

STATS 240P. Statistical Methods in Finance

For SCPD students; see 240.

3 units, Aut (Lai, T)

STATS 241. Statistical Modeling in Financial Markets

(SCPD students register for 241P.) Nonparametric regression and yield curve smoothing. Advanced time series modeling and forecasting. Market risk measures. Substantive and empirical modeling approaches in financial markets. Statistical trading strategies. Prerequisite: 240 or equivalent.

3-4 units, Spr (Lai, T)

STATS 241P. Statistical Modeling in Financial Markets

For SCPD students; see 241.

3 units, Spr (Lai, T)

STATS 243. 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 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 252. Data Mining and Electronic Business

The Internet and related technologies have caused the cost of communication and transactions to plummet, and consequently the amount of potentially relevant data to explode. The underlying principles, statistical issues, and algorithmic approaches to data mining and e-business, with real world examples.

3 units, Spr (Weigend, A)

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. GER:DB-Math

3 units, Spr (Taylor, J)

STATS 254. Correspondence Analysis and Related Methods

Use of correspondence analysis (CA) method for dimension-reduction based on the singular-value decomposition, aimed at frequency data or raw multivariate categorical observations.

Comprehensive treatment of simple and multiple CA and related methods, using R packages and including 2- and 3-dimensional graphics.

3 units, Aut (Staff)

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 (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 270. A Course in Bayesian Statistics
(Same as STATS 370.) Bayesian statistics including theory, applications, and computational tools. Topics: history of Bayesian methods, foundational problems (what is probability), subjective probability and coherence, exchangeability and deFinetti's theorem. Conjugate priors, Laplace approximations, Gibbs sampling, hierarchical and empirical Bayes, nonparametric methods, Dirichlet and Polya tree priors. Bayes robustness, asymptotic properties of Bayes procedures.

3 units, Win (Wong, W)

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 (Staff)

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 (Siegmund, D)

STATS 300C. 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, Spr (Siegmund, D)

STATS 305. Introduction to Statistical Modeling
The linear model: simple linear regression, polynomial regression, multiple regression, anova models; and with some extensions, orthogonal series regression, wavelets, radial basis functions, and MARS. Topics: normal theory inference (tests, confidence intervals, power), related distributions (t, chi-square, F), numerical methods (QR, SVD), model selection/regularization (Cp, AIC, BIC), diagnostics of model inadequacy, and remedies including bootstrap inference, and cross-validation. Emphasis is on problem sets involving substantial computations with data sets, including developing extensions of existing methods. Prerequisites: consent of instructor, 116, 200, applied statistics course, CS 106A, MATH 114.

2-4 units, Aut (Owen, A)

STATS 306A. Methods for Applied Statistics
Extension of modeling techniques of 305: binary and discrete response data and nonlinear least squares. Topics include regression, Poisson loglinear models, classification methods, clustering. May be repeated for credit. Prerequisite: 305 or equivalent.

2-4 units, Win (Efron, B)

STATS 306B. Methods for Applied Statistics
Unsupervised learning techniques in statistics, machine learning, and data mining.

2-4 units, Spr (Hastie, T)

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 (Diaconis, P)

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 (Dembo, A)

STATS 310C. Theory of Probability
(Same as MATH 230C.) Infinitely divisible laws. Continuous time martingales, random walks and Brownian motion. Invariance principle. Markov and strong Markov property. Processes with stationary independent increments. 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
Topics: clustering, biclustering, and spectral clustering. Data analysis using the singular value decomposition, nonnegative decomposition, and generalizations. Plaid model, aspect model, and additive clustering. Correspondence analysis, Rasch model, and independent component analysis. Page rank, hubs, and authorities. Probabilistic latent semantic indexing. Recommender systems. Applications to genomics and information retrieval. Prerequisite: 315A,B, 305, 306A,B, or consent of instructor.

2-3 units, Aut (Tibshirani, R)

STATS 315B. Modern Applied Statistics: Data Mining
Three-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, Win (Friedman, J)

STATS 315C. Modern Applied Statistics: Transposable data
Topics: clustering, biclustering, and spectral clustering. Data analysis using the singular value decomposition, nonnegative decomposition, and generalizations. Plaid model, aspect model, and additive clustering. Correspondence analysis, Rasch model, and independent component analysis. Page rank, hubs, and authorities. Probabilistic latent semantic indexing. Recommender systems. Applications to genomics and information retrieval. Prerequisite: 315A,B, 305/306A,B, or consent of instructor.

2-3 units, Spr (Owen, A)

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, Spr (Siegmund, D)

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, not given this year

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 (Taylor, J), Win (Montanari, A)

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, Spr (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 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, Spr (Tang, H; Zhang, N)

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, Aut (Diaconis, P)

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, Spr (Taylor, J)

STATS 362. Monte Carlo Sampling
Fundamentals of Monte Carlo methods. Generating uniform and nonuniform variables, random vectors and processes. Monte Carlo integration and variance reduction. Quasi-Monte Carlo sampling. Markov chain Monte Carlo, including Gibbs sampling and Metropolis-Hastings. Examples, problems and motivations from Bayesian statistics, computational finance, computer graphics, physics.

2-3 units, Aut (Owen, A)

STATS 366. Computational Biology
(Same as BIOMEDIN 366, STATS 166.) Methods to understand sequence alignments and phylogenetic trees built from molecular data, and general genetic data. Phylogenetic trees, median networks, microarray analysis, Bayesian statistics. Binary labeled trees as

combinatorial objects, graphs, and networks. Distances between trees. Multivariate methods (PCA, CA, multidimensional scaling). Combining data, nonparametric inference. Algorithms used: branch and bound, dynamic programming, Markov chain approach to combinatorial optimization (simulated annealing, Markov chain Monte Carlo, approximate counting, exact tests). Software such as Matlab, Phylip, Seq-gen, Arlequin, Puzzle, Splitstree, XGobi.

2-3 units, Spr (Wong, W)

STATS 370. A Course in Bayesian Statistics
(Same as STATS 270.) Bayesian statistics including theory, applications, and computational tools. Topics: history of Bayesian methods, foundational problems (what is probability), subjective probability and coherence, exchangeability and deFinetti's theorem. Conjugate priors, Laplace approximations, Gibbs sampling, hierarchical and empirical Bayes, nonparametric methods, Dirichlet and Polya tree priors. Bayes robustness, asymptotic properties of Bayes procedures.

3 units, Win (Wong, W)

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 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 (Olshen, R), Win (Tibshirani, R), Spr (Owen, A), 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)

STRUCTURAL BIOLOGY (SBIO) COURSES

For information on graduate programs in Structural Biology, see the "Structural Biology" section of this bulletin. Course and laboratory instruction in the Department of Structural Biology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

UNDERGRADUATE COURSES IN STRUCTURAL BIOLOGY

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, Aut (Levitt, M), Spr (Levitt, M)

SBIO 229. The Eukaryote Chromosome
The principles of chromosome structure and function including the structure, dynamics, and topological forms of DNA; units and hierarchies of DNA coiling in chromosomes; centromeres, telomeres, and basis of chromosome maintenance and sorting in mitosis; mechanism of gene activation with particular regard to enhancer, promoter, and terminator sequences; basis of sequence-specific protein-DNA interaction; and organization and assembly of the cell nucleus. Prerequisite: knowledge of basic biochemistry and cell biology.

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, 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. Prerequisites: introductory biochemistry and physical chemistry or consent of instructor.

3-5 units, Aut (Herschlag, D; Puglisi, J; Garcia, K; Ferrell, J; Block, S; Weis, W)

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 (Weis, W; Puglisi, J), alternate years, not given next year

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 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)

STRUCTURED LIBERAL EDUCATION (SLE) COURSES

For information on undergraduate and graduate programs in Structured Liberal Education, see the "Structured Liberal Education" section of this bulletin.

UNDERGRADUATE COURSES IN STRUCTURED LIBERAL EDUCATION

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 (Mancall, M; Greene, R)

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 (Greene, R; Greenberg, S)

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 (Greene, R)

SLE 199. Teaching SLE
1-3 units, Aut (Mancall, M; Greenberg, S), Win (Mancall, M; Greenberg, S), Spr (Greenberg, S; Greene, R)

SURGERY (SURG) COURSES

The following courses are available to undergraduates or graduate students. For additional graduate and Medical School offerings, see http://medcatalog.stanford.edu.

UNDERGRADUATE COURSES IN SURGERY

SURG 67Q. Health and Medicine in an International World
Stanford Introductory Seminar. Preference to sophomores.Topics may include the history and international development of Interplast, a nonprofit organization providing free reconstructive surgery for needy children and adults in developing nations; health care at King Faisal Hospital, Saudi Arabia; medical conditions in S. India; eye care in Africa; medical teaching experiences in Dar es Salaam and Haiti; and rural health care in Latin America. The role such activities play in U.S. international relationships.
3 units, Win (Wang, N)

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 69Q. It's All in the Head: Understanding Diversity, Development, and Deformities of the Face
Stanford Introductory Seminar. Preference to sophomores. How the face conveys moods and emotions, and elicits reactions when disease or genetic disorders leave behind disfigurement. New work by evolutionary and molecular biologists concerning how variations in facial form are elicited; how tissues and molecules interact to form the face. How differences in facial anatomy affect an individual's self-perception and their acceptance in our beauty-conscious society.
3-4 units, Win (Helms, J; Brugmann, S)

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 102. International Health Opportunities
(Same as SURG 202.) The value of international medical humanitarianism. Topics include: rehabilitation efforts of leprosy cases in South India, orthopedic work in Afghanistan, charity initiatives in Vietnam, mobile surgical missions in Ecuador, construction of specialized hospitals in Nepal and Nigeria, history and development of humanitarian foundations such as Interplast, and service-based community projects in Mexico.
3-4 units, Aut (Laub, D; Dunlap, J; Chase, R)

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; Espinoza, N)

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; Espinoza, N; 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; Espinoza, N)

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.
2-3 units, Aut (Gilbert, G; D'Souza, P; Espinoza, N)

SURG 112B. Advanced Reading and Teaching for the EMT-1
(Same as SURG 212B. 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 111/211A-C or equivalent EMT-Basic certification, CPR for the Professional Rescuer certification, and consent of instructor.

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. 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 111/211A-C or equivalent EMT-Basic certification, CPR for the Professional Rescuer certification, and consent of instructor.

2-3 units, Spr (Gilbert, G; D'Souza, P; Espinoza, N)

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 202. International Health Opportunities
(Same as SURG 102.) The value of international medical humanitarianism. Topics include: rehabilitation efforts of leprosy cases in South India, orthopedic work in Afghanistan, charity initiatives in Vietnam, mobile surgical missions in Ecuador, construction of specialized hospitals in Nepal and Nigeria, history and development of humanitarian foundations such as Interplast, and service-based community projects in Mexico.

3-4 units, Aut (Laub, D; Dunlap, J; Chase, R)

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; Espinoza, N)

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; Espinoza, N; 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; Espinoza, N)

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.

2-3 units, Aut (Gilbert, G; D'Souza, P; Espinoza, N)

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.

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.

2-3 units, Spr (Gilbert, G; D'Souza, P; Espinoza, N)

SURG 223. Wilderness Medicine
Wilderness-related illnesses and injuries; framework for dealing with emergencies in the backcountry. Hands-on workshops. Topics include high altitude medicine, diving medicine, hypothermia, snake and spider envenomations, search and rescue, and travel medicine. Open to all students.

2 units, Spr (Weiss, 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; Woodard, G)

SURG 267. International Health
Topics include: colonialism and development, reproductive health, women's health issues, environmental health, maternal child health, primary health care and its evolution, health policy, infectious disease, human rights and social justice. Guest speakers from UCSF and Berkeley School of Public Health.

1 unit, not given this year

SYMBOLIC SYSTEMS (SYMBSYS) COURSES

For information on undergraduate and graduate programs in Symbolic Systems, see the " Symbolic Systems" section of this bulletin.

UNDERGRADUATE COURSES IN SYMBOLIC SYSTEMS

SYMBSYS 10. Symbolic Systems Forum
A weekly lecture series, featuring different speakers who report on research of general interest to Symbolic Systems students and faculty. Regular attendance required for credit. May be repeated for credit.

1 unit, Aut (Davies, T), Win (Davies, T), Spr (Davies, T)

SYMBSYS 50. Introduction to Cognitive Neuroscience
(Same as PSYCH 50.) 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, Win (McClure, S)

SYMBSYS 91. Junior Honors Seminar
Recommended for juniors doing an honors project during the following year. Defining a topic, choosing an adviser, considering overall goals. Resources at Stanford and some experiences of seniors discussed with guest speakers.

2 units, Win (Davies, T)

SYMBSYS 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 (Wasow, T; Roberts, E)

SYMBSYS 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)

SYMBSYS 170. Decision Behavior: Theory and Evidence
(Same as SYMBSYS 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

SYMBSYS 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)

SYMBSYS 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.
2 units, Aut (Davies, T)

SYMBSYS 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.

SYMBSYS 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, Spr (Davies, T)

SYMBSYS 206. Topics in the Philosophy of Neuroscience
Does understanding the brain or computational models of the brain allow understanding of the mind? Recent literature on neurophilosophical and neuroskeptical approaches to the mind including perception, neurophenomenology, sensorimotor accounts, computational models, and eliminativism. Prerequisites: PHIL 80, and familiarity with philosophy or neuroscience, or consent of instructor. May be repeated for credit.
3 units, Aut (Skokowski, P)

SYMBSYS 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

SYMBSYS 270. Decision Behavior: Theory and Evidence
(Same as SYMBSYS 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

SYMBSYS 290. Master's Degree Project
1-15 units, Aut (Staff), Win (Staff), Spr (Staff), Sum (Staff)

SYMBSYS 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

Because the Tibetan Language Program does not have a formal placement test, students registering for the first time must see the coordinator for proper placement if they have had any prior training in Tibetan. Completion of TIBETLNG 3 fulfills the University Foreign Language Requirement. Consult the Language Center or http://language.stanford.edu/ for information. Language courses may not be repeated for credit and must be taken in sequence.

UNDERGRADUATE COURSES IN TIBETAN LANGUAGE

TIBETLNG 1. First-Year Tibetan, First Quarter
Grammar, reading, and composition. Tibetan culture and the Tibetan view of reality.
5 units, Aut (Clark, R)

TIBETLNG 2. First Year Tibetan, Second Quarter
Grammar, reading, and composition. Tibetan culture and the Tibetan view of reality.
5 units, Win (Clark, R)

TIBETLNG 3. First Year Tibetan, Third Quarter
Grammar, reading, and composition. Tibetan culture and the Tibetan view of reality.
5 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

For graduate students only.

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

For information on undergraduate programs in Urban Studies, see the "Urban Studies" section of this bulletin.

UNDERGRADUATE COURSES IN URBAN STUDIES

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)

URBANST 111. Urban Politics
(Same as POLISCI 121, SOC 149X, SOC 249X.) 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, not given this year

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, Spr (Rosenfeld, M)

URBANST 113. Introduction to Urban Design: Contemporary Urban Design in Theory and Practice
Comparative studies in N. America and abroad of neighborhood conservation, central city regeneration, and growth policies for metropolitan regions. Case studies, team projects, and class workshops in San Francisco. 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 (Inoue, M)

URBANST 115. Urban Sustainabilty: 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
How experience with community organizations provides a starting point for developing community-based senior theses or independent research projects. Principles and practice of doing community-based research as a collaborative enterprise between academic researchers and community members; how academic scholarship can be made useful to community organizations. Guest speakers from community organizations, faculty, and alumni of the Public Service Scholars Program.

2 units, Aut (Cotterman, K)

URBANST 126. Spirituality and Nonviolent Urban and Social Transformation
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. GER:DB-Hum

5 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
Analytical methods, marketing, language, organizational mission, strategy, and finance in the for-profit and nonprofit social sectors. Focus is on the integration of theory and application. Opportunities and limits of methods from the profit sector to meet social goals. Enrollment limited to 20. GER:DB-SocSci

4 units, Win (Kieschnick, M)

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 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

3-4 units, Win (Boesch, D)

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. Utopia and Reality in Modern Urban Planning
(Same as ARTHIST 254.) Primarily for Urban Studies and Art majors. Utopian urbanist thinkers such as Ebenezer Howard, Le Corbusier, and Frank Lloyd Wright who established the conceptual groundwork of contemporary urban planning practice. Research paper. GER:DB-Hum

5 units, not given this year

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 173. Urban Economics
(Same as PUBLPOL 176.) Application of the principles of economic analysis to urban issues and policy, including urban land use, housing, transportation, economic development, and the financing of public services. Fundamentals of microeconomic theory.
4-5 units, Aut (Reilly, M)

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, Spr (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 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 (Staff), Win (Staff), Spr (Staff)

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 and community service? How can communities benefit from research? Theory and practice of research as a form of public service. Readings in research theory and methods of participatory action research; presentations on research as service; workshops on each participant's thesis work-in-progress; public presentation of completed research; thesis evaluation by a community-based reader. May be repeated for credit. Corequisite: 199.
1-3 units, Aut (Schmidt-Posner, J), Win (Schmidt-Posner, J), Spr (Schmidt-Posner, J)

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. Individually arranged internship beginning in Winter Quarter, 8 hours per week. Prospective students must consult with internship coordinator early in Autumn Quarter to plan placement. Reflections and assignments culminate in a research proposal, which may submitted for funding. Internship normally continues in Spring Quarter; research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Corequisite: URBANST 201A.
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. Corequisite: 201 or consent of instructor.
3 units, Aut (Staff), Spr (Staff)

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 (Beck, C)

OVERSEAS STUDIES COURSES IN URBAN STUDIES

For course descriptions and additional offerings, see the respective "Overseas Studies" courses section of this bulletin or http://bosp.stanford.edu. Students should consult their program's student services office for applicability of Overseas Studies courses to a major or minor program.

FLORENCE URBAN STUDIES COURSES

OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization
4 units, Aut (Verdon, T)

WRITING AND RHETORIC, PROGRAM IN (PWR) COURSES

For information on the Program in Writing and Rhetoric, see the "Program in Writing and Rhetoric" and the "Writing Requirement" sections of this bulletin.

UNDERGRADUATE COURSES IN WRITING AND RHETORIC, PROGRAM IN

PWR 1. Writing and Rhetoric 1
Fulfills first level of the writing requirement. 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.
4 units, Aut (Staff), Win (Staff), Spr (Staff)

PWR 2. Writing and Rhetoric 2
Further work in developing skills in argument and research-based writing, with emphasis on oral presentations of research-based arguments. Individual conferences with instructor. Prerequisite: PWR 1.
4 units, Aut (Staff), Win (Staff), Spr (Staff)

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, Aut (Staff), Win (Staff)

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 (Staff), 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 skills in argument and research-based writing, emphasizing 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, Spr (Staff)

PWR 192. Projects in Research, Writing, and Rhetoric
Advanced work on research projects, early drafts of theses, expository excursions, manifestos, scripts, first-hand accounts, investigative reports, proposals, comic disputations, and other textual, rhetorical and imaginative explorations. 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, Aut (Obenzinger, H)

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, Win (Obenzinger, H), Spr (Obenzinger, H)

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 (Sassoubre, T)

PWR 195. Peer Writing Tutor Training Course
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 (Moneyhun, C)

PWR 198X. Tutoring with Adolescents: Ravenswood Writes
(Same as EDUC 198X.) Strategies and approaches for teaching writing to students from diverse backgrounds and languages, and cultural and learning styles. Course prepares students to become tutors for Ravenswood Writes. Prerequisites: application and committee approval.
3 units, not given this year

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. Organizations in this section are listed alphabetically by their formal name.

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://www.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

ENVIRONMENTAL SCIENCES

Global Climate and Energy Program (G-CEP)
Precourt Institute for Energy Efficiency
Woods Institute for the Environment

HUMANITIES AND SOCIAL SCIENCES

Center for Advanced Study in the Behavioral Sciences (CASBS)
Freeman Spogli Institute for International Studies (FSI)
Human-Sciences and Technologies Advance Research Institute (H-STAR), including SCIL, Media-X, and Center for the Study of Language And Information (CSLI)
Stanford Center on Longevity (SCL)
Stanford Humanities Center
Stanford Institute for Economic Policy Research (SIEPR)

PHYSICAL SCIENCES

Edward L. Ginzton Laboratory
Geballe Laboratory for Advanced Materials (GLAM)
Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), operated jointly with SLAC
Photon Ultrafast Laser Science and Engineering (PULSE), operated jointly with SLAC
Stanford Institute for Materials and Energy Sciences (SIMES), operated jointly with SLAC
W. W. Hansen Experimental Physics Laboratory (HEPL)

OTHER ACADEMIC PROGRAMS AND CENTERS, AND INDEPENDENT RESEARCH LABORATORIES, CENTERS, AND INSTITUTES

The Center for Space Science and Astrophysics, the Institute for Research in the Social Sciences (IRiSS), and the Morrison Institute for Population and Resource Studies report to the School of Humanities and Sciences.

The Hoover Institution on War, Revolution and Peace and the Stanford Linear Accelerator Center (SLAC) report to the President and Provost.

SLAC is independently operated under a contract with the Department of Energy. KIPAC, PULSE, and SIMES are operated jointly with SLAC and the Office of Vice Provost and Dean of Research.

CENTER FOR ADVANCED STUDY IN THE BEHAVIORAL SCIENCES (CASBS)

Director: Claude Steele
Deputy Director: Ann C. Petersen
Center Offices: 75 Alta Road, Stanford, CA 94305
Mail Code: 94305-2130
Web Site: http://www.casbs.org

The Center for Advanced Study in the Behavioral Sciences at Stanford (CASBS) is dedicated to advancing knowledge about human behavior and fostering contributions to society. CASBS does this through several programs, and primarily residential fellowships. Other programs are special projects within the residential year, extended seminars involving groups of scholars who meet at the Center over two to three years, and summer institutes. For all these programs, CASBS identifies the most accomplished and promising scholars in the fields represented by the Center.

CASBS programs seek to advance knowledge, advance fields of humanities and the social and behavioral sciences, and contribute to society. Groups of scholars gathered together at the Center stimulate each other to broaden and deepen their thinking. The specific methods of CASBS are the social interactive process of interdisciplinary stimulation, intellectual freedom and time, and staff support. These social structures in the microenvironment permit fellows to engage new and challenging ideas, to think clearly and analytically, and to write more profoundly and prolifically than at any other time in their careers. Young scholars especially benefit from this environment and build their fields in a way influenced by their experience at the Center.

CENTER FOR HISTORY AND PHILOSOPHY OF SCIENCE

Executive Director: Michael Friedman
HST Director: Jessica Riskin
LMPS Director: Michael Friedman

The Center for History and Philosophy of Science (CHPS) brings together faculty and research initiatives concerned with understanding science, technology and medicine from historical, philosophical, logical, methodological, and cultural points of view. CHPS comprises two divisions: the Division of History of Science and Technology (HST) and the Division of Logic, Methodology, and Philosophy of Science (LMPS). HST and LMPS, both separately and in cooperation, sponsor visiting scholars, postdoctoral researchers, workshops, and speakers, providing a bridge between the humanities and sciences.

HST involves primarily historians of science, technology, and medicine, and cooperates with other units concerned with the social and cultural context of these disciplines. LMPS involves primarily philosophers of science and logicians, and cooperates with other units concerned with logic and methodology. CHPS as a whole pursues the history and philosophy of all of these areas, and is connected in this way with the Program in History and Philosophy of Science and Technology (HPST). HPST is an interdisciplinary graduate program jointly administered by the History and Philosophy departments. Prospective students interested in applying to the graduate program should consult the "History and Philosophy of Science and Technology" section of this bulletin, and the admissions requirements of the department in which they wish to apply for an M.A. or Ph.D.

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 (Electrical Engineering), Robert V. Wagoner, Alan T. Waterman; *(Associate Professor)* Bruce B. Lusignan (Electrical Engineering); *(Professors, Research)* Donald L. Carpenter, Aldo V. daRosa, Antony Fraser-Smith
Director: Robert V. Wagoner
Associate Directors: Umran S. Inan, Roger W. Romani, 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)
Associate Professors: Tom Abel (Physics, SLAC), Steve Allen (Physics, SLAC), Sarah Church (Physics), Guenther Walther (Statistics), Howard Zebker (Electrical Engineering, Geophysics)
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 Stanford Linear Accelerator Center. 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.

Research now in progress covers a wide array of investigations and is approached in a variety of ways, including experiments flown on rockets, satellites, and space probes; ground-based observations made from the Hobby-Eberly Telescope, the Wilcox Solar Observatory, and from national observatories; and theoretical research including computer modeling. Topics currently being studied include cosmology, gamma-ray astronomy, gravitation theory and experiments, including gravitational waves (LIGO, LISA), guidance and control, high-energy astrophysics, ionospheric and magnetospheric physics, microwave and infrared astronomy, planetary sciences, solar physics, solar-terrestrial phenomena, theoretical astrophysics, x-ray astronomy, and the study of life in the universe. Some of these projects involve opportunities for collaboration with scientists at the Lockheed-Martin Research the NASA/Ames Research Center, and the SETI Institute.

Stanford is a member of the Universities Space Research Association, a consortium of universities which operates the Lunar Science Institute in Houston, Texas; the University Corporation for Atmospheric Research in Boulder, Colorado; and the San Diego Supercomputing Consortium.

Stanford is the lead institution for the GLAST gamma-ray observatory, Gravity Probe B, and the Solar Oscillations Investigation on the Solar and Heliospheric Observatory spacecraft (SOHO). Stanford is also a member of the Hobby-Eberly Telescope Consortium which operates a 10-meter telescope at the McDonald Observatory of the University of Texas. Members are also involved in the design of the Large Synoptic Survey Telescope (LSST).

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.

Further information is available from the director.

EDWARD L. GINZTON LABORATORY

Director: Robert L. Byer
Deputy Director: Olav Solgaard
Office: 450 Via Palou
Mail Code: 94305-4088
Phone: 650-723-0107
Fax: 650-725-7509
Web Site: http://www.stanford.edu/group/ginzton

The Ginzton Laboratory houses the research activities of a number of faculty members from the departments of Applied Physics, Electrical Engineering, and Mechanical Engineering. The multidisciplinary foundations of faculty, students, and research provide a dynamic academic environment for scientific research in the fields of photonic science and engineering, quantum science and engineering, and nanoscience and engineering, including fiber optics, laser physics and applications, mesoscopic devices, microelectromechanical and microacoustic devices and systems, optoelectronic devices and systems, photonics, nanophotonics and photonic crystals, scanning optical microscopy, quantum cryptography and computing, tunneling and force microscopy, and ultrafast and nonlinear optics.

FREEMAN SPOGLI INSTITUTE FOR INTERNATIONAL STUDIES (FSI)

Director: Coit D. Blacker
Deputy Director: Michael A. McFaul
Institute Office: Encina Hall, 616 Serra Street
Phone: (650) 723-4581
Web Site: http://fsi.stanford.edu

The Freeman Spogli Institute for International Studies (FSI) is Stanford University's primary forum for interdisciplinary research on contemporary international issues and challenges. Working in partnership with the seven schools at Stanford and the Hoover Institution, FSI undertakes collaborative research and teaching which transcend disciplinary, school, and national boundaries. Priority areas of research include: efforts to prevent nuclear proliferation and ensure effective responses to acts of biological, chemical, or nuclear terrorism; linkages among democracy, development, and the rule of law; global healthcare delivery and outcomes; political, economic, and social change in the Asia-Pacific region; national, regional, and multilateral security concerns in the region; European integration;

trade-offs among energy, food security, and environmental degradation; global justice and human rights; overcoming barriers to conflict resolution; and the political, legal, and economic factors affecting the operation of modern energy markets.

Opportunities for undergraduate research include the CISAC Interschool Honors Program in International Security Studies and the CDDRL Undergraduate Honors Program. The institute manages five student fellowship programs and three faculty grant programs.

Constituent centers within FSI include: the Center on Democracy, Development, and the Rule of Law; the Center for Health Policy/Center for Primary Care and Outcomes Research; the Center for International Security and Cooperation; and the Walter H. Shorenstein Asia-Pacific Research Center.

FSI administers the following programs: the Forum on Contemporary Europe; the Program on Food Security and the Environment; the Inter-University Center for Japanese Language Studies; the Program on Energy and Sustainable Development; the Program on Global Justice; the Stanford Center on International Conflict and Negotiation; and the Stanford Program on International and Cross-Cultural Education.

For more information about particular FSI centers and programs, contact the center or program directly (area code 650):

- *Center on Democracy, Development, and the Rule of Law (CDDRL)*—724-7197, http://cddrl.stanford.edu, Michael McFaul, Director
- *Center for Health Policy/Center for Primary Care and Outcomes Research (CHP/PCOR)*—723-1020, http://healthpolicy.stanford.edu, Alan M. Garber, Director
- *Center for International Security and Cooperation (CISAC)*—723-9625, http://cisac.stanford.edu, Siegfried S. Hecker, Co-Director; Lynn Eden, Acting Co-Director
- *Walter H. Shorenstein Asia-Pacific Research Center (Shorenstein APARC)*—723-9741, http://aparc.stanford.edu, Michael H. Armacost, Acting Director
- *Program on Food Security and the Environment*—725-6851; http://fse.stanford.edu, Rosamond Naylor, Director
- *Forum on Contemporary Europe (FCE)*—725-1495, http://fce.stanford.edu, Amir Eshel, Director
- *Inter-University Center for Japanese Language Studies (IUC)*—725-1490, http://www.stanford.edu/dept/IUC, Steven Carter, Director
- *Program on Energy and Sustainable Development (PESD)*—724-1714, http://pesd.stanford.edu, David G. Victor, Director
- *Program on Global Justice (PGJ)*—723-0256, http://globaljustice.stanford.edu, Joshua Cohen, Director
- *Stanford Center on International Conflict and Negotiation (SCICN)*—723-2574, http://www.law.stanford.edu/program/centers/scicn, David J. Holloway, Allen Weiner, Co-Directors
- *Stanford Program on International and Cross-Cultural Education (SPICE)*—723-1116, http://spice.stanford.edu, Gary Mukai, Director

INTERSCHOOL HONORS PROGRAM IN INTERNATIONAL SECURITY STUDIES

Co-Directors: Michael M. May, Paul Stockton

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. Ideally, applicants to the program should have taken: POLISCI 114S, International Security in a Changing World; MS&E 193, Technology and 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; and 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, C223 Encina Hall Central, telephone (650) 723-9626, or http://cisac.stanford.edu.

CDDRL UNDERGRADUATE HONORS PROGRAM

The Center on Democracy, Development, and the Rule of Law (CDDRL) Honors Program provides students majoring in International Relations 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 bi-weekly with faculty and their peers to present project theses and receive feedback. Students must attend honors college in September before Autumn Quarter classes begin and the weekly CDDRL seminar.

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.

GEBALLE LABORATORY FOR ADVANCED MATERIALS (GLAM)

Director: Paul McIntyre
Associate Director: Droni Chiu
Offices: McCullough Building, 476 Lomita Mall
Mail Code: 94305-4045
Fax: 650-723-3044
Web Site: http://www-glam.stanford.edu

The Geballe Laboratory for Advanced Materials (GLAM) is an Independent Laboratory that reports to the Dean of Research. The Laboratory supports the research activities of more than 20 faculty members from the departments of Applied Physics, Chemical Engineering, Chemistry, Electrical Engineering, Materials Science and Engineering, Mechanical Engineering, and Physics. The multidisciplinary foundations of faculty, students, and research provide a dynamic academic environment for a broad spectrum of scientific research areas including high temperature superconducting materials and devices, mesoscopic devices, magnetic recording and storage media materials, electronic materials, opto-electronic materials, nanoscale materials and phenomena, nanoprobe devices, highly correlated electronic systems, computational materials science, condensed matter theory and physics, polymeric and biological materials, crystal growth, and thin film synthesis of complex oxides.

GLAM also has a newly remodeled Stanford Nanocharacterization Laboratory which provides advanced materials characterization and synthesis facilities for its members as well as for the Stanford materials research community at large. The instruments include a focused ion beam (FIB), scanning electron microscopy (SEM), scanning probe microscopy (SPM), transmission electron microscopy (TEM), x-ray diffraction analysis (XRD), x-ray photoelectron spectroscopy (XPS), and high resolution Auger electron spectroscopy (AES) for characterization and thin film

deposition capabilities for synthesis of materials. These facilities are managed by professional staff who also conduct research and development of new tools and techniques in areas related to advanced materials synthesis and characterization. GLAM is also home to the Center for Probing the Nanoscale, a nanoscale science and engineering center sponsored by the National Science Foundation, the Stanford Center for Magnetic Nanotechnology, and the Center for Advanced Molecular Photovoltaics, funded by the King Abdullah University for Science and Technology (KAUST). GLAM also maintains a strong link to the Stanford Insititute for Materials Energy Science (SIMES) on campus and at SLAC.

The Geballe Laboratory for Advanced Materials is housed in the Moore Materials Research Building and McCullough Building complex.

HOOVER INSTITUTION ON WAR, REVOLUTION AND PEACE

Director: John Raisian
Web Site: http://www-hoover.stanford.edu

The Hoover Institution, founded in 1919 by Stanford alumnus Herbert Hoover, is a public policy research center devoted to the advanced study of politics, economics, and political economy, both domestic and foreign, as well as international affairs. Hoover fellows are the foundation of the research program. This varied and distinguished community of scholars strives to conceive and disseminate ideas defining a free society within the framework of three programs:

American Institutions and Economic Performance—Focus is on interrelationships of U.S. political and legal institutions and economic activity, often referred to as political economy.

Democracy and Free Markets—Focus is on political economy in countries around the world.

International Rivalries and Global Cooperation—Focus is on interrelationships among countries, by examining issues of foreign policy, security, and trade.

By collecting knowledge, generating ideas, and disseminating both, the Institution seeks to secure and safeguard peace, improve the human condition, and limit government intrusion into the lives of individuals, all of which are consistent with three prominent values: peace, personal freedom, and the safeguards of the American system.

HUMAN SCIENCES AND TECHNOLOGIES ADVANCED RESEARCH INSTITUTE (H-STAR)

Executive Committee: Keith Devlin, Valerie Halperin, Roy Pea, Byron Reeves
Web Site: http://hstar.stanford.edu

H-STAR (Human Sciences and Technologies Advanced Research) is an interdisciplinary research institute focusing on how people use technology, how to better design technology to make it more usable and more competitive in the marketplace, how technology affects people's lives, and the innovative use of technologies in research, education, art, business, commerce, entertainment, communication, national security, and other walks of life. Among the problems at the heart of the H-STAR research agendas are:

- Reducing complexity of technology to enable its universal uses for work, learning and other vital sectors of life
- Closing digital divides across class, race, gender, age, and nations, so that access to and fluencies in technologies provide equal opportunities to learn and work productively
- Accelerating innovation in the creation and diffusion of products and services that better meet human needs
- Solving security and trust problems of computing, communications, and information systems at home and work and in governmental affairs
- Ensuring safety and health with human-centered technology innovations

Within H-STAR are two interdisciplinary centers, CSLI (the Center for the Study of Language and Information) and SCIL (the Stanford Center for Innovations in Learning), and an industry partners program, Media X.

CENTER FOR THE STUDY OF LANGUAGE AND INFORMATION (CSLI)

Director: Stanley Peters
Center Offices: Cordura Hall
Mail Code: 94305-4115
Web Site: http://www-csli.stanford.edu

CSLI supports research at the intersection of the social and computing sciences. It is an interdisciplinary endeavor, bringing researchers together from academe and industry in the fields of artificial intelligence, computer science, engineering, linguistics, logic, education, philosophy, and psychology. CSLI's researchers are united by a common interest in communication and information processing that ties together people and interactive technology.

The technologies of interest at CSLI, at the cutting edge of the information revolution, include natural language processing, voice/user interfaces, ubiquitous computing, collaborative work environments, handheld devices, information appliances, automatic language translation, conversational interfaces, machine learning, intelligent agents, electronic customer relationship management, and distance learning applications.

A primary goal of CSLI is to have a substantial and long-term intellectual impact on the academic and business communities involved with interactive technology. The center's industry research partners and sponsors have access to ideas, faculty, students, and laboratories. Partners can share in the intellectual property of CSLI, and in the governance committees of the center that establish research directions and funding priorities. CSLI accelerates knowledge transfer to products and services by involving executives and researchers in Stanford classrooms. CSLI partners can meet Stanford students studying in over 20 degree programs.

Course work related to the research at CSLI can be found in the "Program in Symbolic Systems" section of this bulletin.

STANFORD CENTER FOR INNOVATIONS IN LEARNING (SCIL)

Director: Roy Pea
Center Offices: Wallenberg Hall (Building 160)
Web Site: http://scil.stanford.edu

The Stanford Center for Innovations in Learning (SCIL) conducts scholarly research to advance the science, technology, and practice of learning and teaching from early childhood through postsecondary education. The center brings together teachers, scholars, and students from around the world to study how to improve formal and informal learning across cultural boundaries.

SCIL is housed in Wallenberg Hall, a state-of-the-art testing ground for technology applications in the classroom. With the support of SCIL technical and advisory staff, more than 70 professors and instructors have taught courses in Wallenberg Hall.

SCIL programs are multidisciplinary and collaborative in nature and include the LIFE Center (Learning in Informal and Formal Environments), a research endeavor funded by the National Science Foundation whose researchers are working toward the development of an integrated multidisciplinary science of learning. Engaging more than 40 faculty members and researchers from the learning sciences, psychology, education, communications, computer science, and developmental, cognitive, and social neuroscience, LIFE is a collaboration with the University of Washington and SRI International.

In addition to its research work, SCIL provides year-round technical and advisory support to University instructors.

MEDIA X

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

Media X builds bridges between faculty and student scholars at Stanford and thought leaders from influential companies to address questions of importance within academia and industry. Activities are driven by the inspiration that emerge at the intersections of industry need and academic research, of various disciplines addressing the same question, and of people and technology.

INSTITUTE FOR RESEARCH IN THE SOCIAL SCIENCES (IRiSS)

Director: Karen Cook
Executive Director: Chris Thomsen
Office: 450 Serra Mall, Building 370
Mail Code: 94305-2077
Phone: (650) 724-5221
Email: IRiSS-info@stanford.edu
Web site: http://iriss.stanford.edu

The Institute for Research in the Social Sciences (IRiSS) supports the research of Stanford faculty, graduate students. and undergraduate across the social sciences. IRiSS has a two-fold mandate: to advance discovery research in areas involving a mix of questions of anthropology, communication, economics, political science, psychology, and sociology, often addressing major societal challenges; and to build core research infrastructure that strengthens scientific inquiry.

IRiSS hosts the Stanford Center for the Study of Poverty and Inequality, the Stanford Center on Philanthropy and Civil Society, the Social Science History Program, and the Stanford Institute for the Quantitative Study of Society. Research projects consist of: the American National Election Studies (ANES), a collaboration with the University of Michigan's Institute for Social Research; Educational Diversity in Graduate Education in the Social, Behavioral and Economic Sciences (EDGE-SBE), a multi-university collaboration sponsored by the National Science Foundation aimed at increasing the number of under-represented minorities in the social, behavioral, and economic sciences who enter and complete Ph.D. programs; and the Minerva Project, a longitudinal study examining how scientific ideas, scholarly networks, and their institutional contexts influence each other.

In addition, the institute provides programs, funding opportunities, and technology initiatives to enhance research for faculty and graduate students. These include: annual awards made through a peer-reviewed proposal process for seed grants and faculty fellow appointments; an early career faculty program; an experimental research program for nonmedical subjects; and research methods training with a certification option for Ph.D. students. IRiSS also offers conferences and workshops to explore new collaborative research topics.

IRiSS participates in a collaborative program with the Stanford Libraries in providing access to Academic Technology Specialists (ATS) for the social sciences. The technology resources they support include: the Secure Data Center, including the Stanford Branch of the Northern California Census Research Data Center; the development of geographic information systems (GIS); online survey design and implementation; and the creation of high performance computing grids and data visualization systems (for the manipulation of data sets).

SOCIAL SCIENCE HISTORY INSTITUTE

Directors: Stephen Haber
Office: 450 Serra Mall, Building 370
Mail Code: 94305-2077
Phone: (650) 723-1466
Email: toney@stanford.edu
Web Site: http://sshi.stanford.edu

The goal of the Social Science History Program is to re-engineer the manner in which students in social science departments learn about historical institutions and data, and the manner in which students in history and related disciplines are trained in social science methods. Historians and social scientists share many of the same substantive interests, such as the development of economies, political systems, and social structures, but they approach them with different and complementary methods and bodies of evidence. There is a great deal of potential for historians and social scientists to draw from the strengths of each other's methods to improve their own work and to foster increased interaction among the disciplines that employ history as a laboratory to operationalize social science theories. The Social Science History Program seeks to realize this potential by transplanting state-of-the-art research methods from classics, economics, history, political science, and sociology across the boundaries of each discipline. Toward this end, SSHP offers conferences and research support for faculty and graduate students. The program is an affiliate of the Institute for Research in the Social Sciences.

STANFORD CENTER ON PHILANTHROPY AND CIVIL SOCIETY

Faculty Directors: Debra Meyerson, Rob Reich, Walter Powell
Managing Director: Malka Kopell
Office: 562 Salvatierra Walk
Mail Code: 94305-8620
Phone: (650) 723-72599
Email: malkak@stanford.edu
Web site: http://haas.stanford.edu/index.php/item/1684

The Stanford Center on Philanthropy and Civil Society was established in September 2006 as a program of the Institute for Research in the Social Sciences, a unit of the School of Humanities and Sciences. The center's goal is not to build a separate field of study, but to draw on current research by Stanford faculty, Ph.D. students, and advanced undergraduates on civil society and the public sphere and to infuse these topics into the core disciplines of the humanities and social sciences, while building on expertise located in the professional schools. The center's mission, therefore, is to engage students, faculty, and practitioners in examining ways in which philanthropic institutions, nonprofit organizations, and other key elements of civil society work to define and address public interests in the United States and abroad.

To pursue these goals, the Center offers Ph.D. fellowships, support for undergraduates writing honor's theses, seminar series and dialogues, undergraduate classes, and a Ph.D. workshop. Additionally, the center links theory and practice by engaging practitioners in the philanthropic and civil sector. By connecting students and faculty with practitioners through workshops, presentations, and structured conversations, the center is building a community of scholars and practitioners working to effect social change.

STANFORD CENTER FOR THE STUDY OF POVERTY AND INEQUALITY

Director: David B. Grusky
Office: 450 Serra Mall, Building 80
Mail Code: 94305-2029
Phone: (650) 724-6913
Email: inequality@stanford.edu
Web site: http://www.inequality.com

The Center for the Study of Poverty and Inequality supports research, training, and dissemination on issues of social, economic, and political inequality. A unit of the Institute for Research in the Social Sciences, the center has over 125 Stanford faculty affiliates, over 400 national and international fellows, and a program of visiting scholars.

The center supports a graduate training program in poverty and inequality in collaboration with the Public Policy Program. With funding from the Elfenworks Foundation, the center brings scholars of poverty and inequality to Stanford University to teach innovative classes, deliver public lectures, and develop new policy. The center sponsors the Berkeley-Stanford inequality workshop as well as a program of public lectures and seminars on poverty and inequality topics, including the Controversies in Inequality series.

Center faculty affiliates carry out research on a poverty and inequality topics, including causes and consequences, measuring techniques, and effects of interventions to reduce poverty and inequality.

In collaboration with Stanford University Press, the center sponsors the Controversies in Inequality series that addresses policy decisions about poverty and inequality and develops approaches to address them. In 2008, the center launched a web and hard copy magazine, *Pathways*. The center's web site serves as a clearinghouse for research, videos, podcasts, and trend data on poverty and inequality.

KAVLI INSTITUTE FOR PARTICLE ASTROPHYSICS AND COSMOLOGY (KIPAC)

Director: Roger Blandford
Deputy Director: Sarah Church
Campus Mailing Address: Physics Astrophysics Building, 452 Lomita Mall
Campus Mail Code: 94305-4085
SLAC Mailing Address: SLAC 2575 Sand Hill Road, M/S 29, Menlo Park, CA 94025
Web Site: http://www-group.slac.stanford.edu/kipac

KIPAC is an independent laboratory funded in part by Stanford University and the Department of Energy. KIPAC was founded to explore new fronts and challenges in particle astrophysics and cosmology, including the study of the very large and the study of the very small as a source of fundamental questions.

MICHELLE R. CLAYMAN INSTITUTE FOR GENDER RESEARCH

Director: Londa Schiebinger
Associate Director: Michelle Cale
Program Manager: Jane Gruba-Chevalier
Accounting Associate: Eric Scarry
Artist in Residence: Valerie Miner
Art Curator: Heather Green
Residential Research Fellows: Deborah Kolb, Fredi Kronenberg, Deboleena Roy, Nhung Tran
Institute Office: Serra House, 589 Capistrano Way
Mail Code: 94305-8640
Phone: (650) 723-1994
Web Site: http://gender.stanford.edu

Founded in 1974, the Clayman Institute contributes to the development of greater gender equity in society through the creation of innovative research studies and the dissemination of key findings to decision makers in universities, business, communities, and government.

The institute focuses primarily on gender issues in science, technology, engineering, and mathematics. It brings together faculty and students in interdisciplinary seminars, and organizes guest lectures and conferences open to the general public. It recently published a volume entitled *Gendered Innovations in Science and Engineering,* edited by Londa Schiebinger, and a report entitled *Dual Career Academic Couples: What Universities Need to Know* which is available for download from the institute's web site. In-house research projects include: why mid-level women leave technology jobs in Silicon Valley; and women in entrepreneurship and venture capital. The institute also offers prizes and awards to graduate students and faculty, including seven graduate dissertation fellowships, and hosts up to seven residential research fellows who contribute to the institute's research studies and broader research agenda. Each quarter, the institute hosts a new exhibition of gender-related art work, artists' salons and receptions, and meetings of its Professional Women Artists' Group.

MORRISON INSTITUTE FOR POPULATION AND RESOURCE STUDIES

Faculty: (Director) Marcus Feldman (Biology), William H. Durham (Anthropology), Paul R. Ehrlich (Biology), Lawrence H. Goulder (Economics and Freeman Spogli Institute for International Studies), Li Shuzhuo (Xi'an Jiaotong University, China), Shripad Tuljapurkar (Biology)

Institute Office: 371 Serra Mall (Gilbert 116)
Mail Code: 94305-5020
Phone: (650) 723-7518
Email: morrisoninstitute@stanford.edu
Web Site: http://www.stanford.edu/group/morrinst

Although Stanford University does not have a degree program in population studies, it does have scholars of international reputation in specialties such as demographic history, demographic methods, economic demography, epidemiology, population biology, population genetics, and the sociology and anthropology of populations.

The Morrison Institute for Population and Resource Studies is an interdisciplinary group serving three major functions: (1) encouraging graduate work in population and resource studies through fellowship grants and supervision, (2) instituting courses and seminars in population and resource studies, and (3) bringing visiting faculty to Stanford to strengthen existing course offerings. The institute also organizes an interdisciplinary Colloquium on Population Studies to introduce upper-division undergraduates and graduate students to issues in population-related specialties.

PHOTON ULTRAFAST LASER SCIENCE AND ENGINEERING (PULSE)

Director: Phil Bucksbaum
SLAC Address: 2575 Sand Hill Road, Menlo Park, CA 94025
Web Site: http://photonscience.slac.stanford.edu/pulse/index.php

PULSE (Photon Ultrafast Laser Science and Engineering) is based on the construction of the world's first x-ray free electron laser. The construction of this new x-ray source, called the Linac Coherent Light Source (LCLS), is funded by the Department of Energy, and its operation is planned to begin toward the end of calendar 2008. LCLS will provide x-ray beams of unprecedented brightness, delivered in femtosecond pulses with full transverse coherence.

PULSE builds on, and leverages existing strengths in, atomic physics, chemistry, biology, and condensed matter physics. The center plans to focus on ultrafast structural and electronic dynamics in materials science, the generation of attosecond laser pulses, single molecule imaging, and the origin of efficient light harvesting and solar energy conversion in molecular systems during the first three years of operation.

PRECOURT INSTITUTE FOR ENERGY EFFICIENCY (PIEE)

Director: James L. Sweeney
Deputy Director: John Weyant
Institute Address: Yang and Yamazaki (Y2E2), Room 175, 473 Via Ortega
Mail Code: 94305-4205
Web Site: http://piee.stanford.edu

The Precourt Institute for Energy Efficiency (PIEE), founded in October 2006, conducts research and analysis through interdisciplinary teams of faculty, postdoctoral fellows, graduate students, and undergraduates students. The institute's mission is to improve opportunities for and implementation of energy efficient technologies, systems, and practices, with an emphasis on economically attractive deployment. Research includes technology development, economic analysis, policy analysis, and behavioral research.

PIEE adopts a broad systems approach, examining links among technology, policy, and market diffusion in areas such as: energy-efficiency problems in economic sectors such as buildings, transportation, and electric power; supply- and demand-side barriers and solutions to energy-efficiency challenges; combining engineering, economic, and political expertise in devising solutions to energy-efficiency challenges; and the decision making environment in corporations, public organizations, and households.

STANFORD CENTER ON LONGEVITY (SCL)

Director: Laura L. Carstensen, Ph.D.
Deputy Director: Thomas Rando, M.D., Ph.D.
Center Office: Encina Hall, East Wing, Fifth Floor, 616 Serra Street
Mail Code: 94305-6053
Web Site: http://longevity2.stanford.edu

The aim of the Center is to use increased life expectancy to bring about profound advances in the quality of life from early childhood to old age.

The center sponsors an interdisciplinary mobility project to integrate new technologies and to institute streamlined methods of assisting Stanford faculty with the development of innovative ideas. Major disciplines represented in this project are biology, medicine, engineering, psychology, economics, urban planning, and the d.school.

STANFORD HUMANITIES CENTER

Director: Aron Rodrigue
Associate Director: Matthew Tiews
Web Site: http://shc.stanford.edu

The Stanford Humanities Center promotes research and education in the humanities at Stanford and nationwide. In particular, it stresses work of an interdisciplinary nature, accomplished through the following programs: one-year residential fellowships for Stanford faculty, faculty members from other institutions, and Stanford graduate and undergraduate students; public presentations such as lectures, conferences, and publications; and a research workshop program that brings faculty and graduate students together regularly to advance ongoing research on topics of interdisciplinary interest.

Fellows are selected on the basis of an open competition. They pursue their own research and participate in a weekly seminar at the center throughout the year. Faculty fellows also contribute to the intellectual life of the Stanford community through activities such as giving departmental courses, participating in ongoing research workshops, or organizing conferences.

STANFORD INSTITUTE FOR ECONOMIC POLICY RESEARCH (SIEPR)

Director: John B. Shoven
Deputy Director: Gregory Rosston
Institute Office: 579 Serra Mall
Phone: (650) 725-1874
Web Site: http://siepr.stanford.edu

The primary mission of the Stanford Institute for Economic Policy Research (SIEPR) is to encourage and support research on economic policy issues in areas such as economic growth, technology policies, environmental and telecommunication regulation, tax reform, international trade, and monetary policy. SIEPR pursues four interrelated goals in support of this mission: (1) facilitating graduate student and faculty research on economic policy issues; (2) building a community of scholars conducting policy research; (3) disseminating research findings broadly; and (4) linking academics at Stanford with decision makers in business and government.

SIEPR is a University-wide research institute, involving economists from the schools of Business, Engineering, Law, Humanities and Sciences, as well as the Hoover Institution and the Institute for International Studies. Affiliated faculty and students maintain appointments in their home departments while working on SIEPR projects. In addition, scholars visiting from other institutions may apply for affiliation with SIEPR.

Much of the research at SIEPR takes place in its three research centers and six programs. The Stanford Center for International Development (SCID; Roger G. Noll, Director) fosters research on the economic problems of developing economies and economies in transition, as well as analyzing the political aspects of economic policy reform and historical episodes of reform. For more information about this center call (650) 725-8730. The Center on Employment and Economic Growth (CEEG; Tim Bresnahan, Director) is focusing on the relationship between long-term economic growth, the economic success of individuals and families in their jobs and careers, and the role played by higher education and how it can supply workers and technology in the work force. The program on regulation is part of this center. The Center for Public and Private Finance (CPPF; John B. Shoven and Michael J. Boskin, co-Directors) encompasses work on macroeconomics and monetary policy, tax and budget policy, and finance.

Separate research programs within SIEPR and their directors are the California Policy Program (Thomas MaCurdy); the Energy, Natural Resources, and the Environment Program (James L. Sweeney); the Knowledge Networks and Institutions for Innovation Program (Paul A. David); the Program on the Japanese Economy (Masahiko Aoki); and the Program on Market Design (Susan Athey and Paul Milgrom).

STANFORD INSTITUTE FOR MATERIALS AND ENERGY SCIENCES (SIMES)

Director: Z-X Shen
Campus Office: 476 Lomita, McCullough Bldg., Room 136
Campus Mail Code: 94305-4045
Campus Phone: 650-723-3458
SLAC Office: Building 137, Room 306, Stanford Linear Accelerator Center, 2575 Sand Hill Road, MS 69, Menlo Park, CA 94025
SLAC Phone: 650-926-5913
Web Site: http://photonscience.slac.stanford.edu/xlam/index.php

SIMES, a research unit within the Photon Science Directorate at SLAC, addresses key challenges associated with the Department of Energy's mission in the areas of condensed matter physics and materials science, providing scientific leadership in using and developing photon science devices and detectors and other SLAC facilities. SIMES also provides theoretical leadership and support for photon/materials-based experiments at SLAC. The emphasis of this core group is in scattering, spectroscopy, and imaging using the Stanford Synchrotron Radiation Laboratory (SSRL) and the Linac Coherent Light Source (LCLS).

The SLAC-based core capabilities include x-ray scattering, x-ray absorption and emission spectroscopy, angle-resolved photoemission, time-resolved scattering and spectroscopy, and spectro-microscopy. The emphasis has been the unique photon source at SLAC and its related spectroscopy and scattering expertise; there are plans for a strong computational component of this core to support the interpretation of experimental data. The SLAC photon based experimental techniques have been applied to strongly correlated materials, magnetic materials, low-dimensional materials, molecular solids, materials made of nano-clusters, surfaces and interfaces, and catalysis. XLAM programs plan to extend this effort to include matters under extreme conditions, such as high magnetic field and high pressure.

SIMES serves as a link between SLAC and the intellectual resources in other Stanford schools such as the Geballe Laboratory for Advanced Materials (GLAM). XLAM serves to couple SLAC and the Stanford campus by engaging the larger Stanford community to participate in DOE's basic energy science research enterprise. SIMES programs co-located with GLAM in the McCullough Building include materials synthesis, local probe microscopy, condensed matter theory, and organic/inorganic interfaces.

STANFORD INSTITUTE FOR THE QUANTITATIVE STUDY OF SOCIETY

Director: Norman H. Nie
Center Offices: 417 Galvez Mall, Encina Hall West, first floor
Mail Code: 94305-6048
Phone: (650) 723-7242
Web Site: http://www.stanford.edu/group/siqss

Founded in 1998, the Stanford Institute for the Quantitative Study of Society (SIQSS) is a multidisciplinary research institute affiliated with Stanford University's Office of Research and Graduate Policy. The Institute is devoted to producing and sponsoring high-quality empirical social science research about the nature of society and social change.

The central mission of SIQSS is to provide social knowledge for the larger society and to develop the empirical social sciences as a primary tool for understanding social reality. SIQSS seeks to fulfill this mission by undertaking large-scale, socially relevant, theoretically important, and methodologically sound social research. Examples of projects under way include unintended consequences of information and technology in society; education and its social outcomes; conducting the 2000 census under adversity; and an online scholarly journal, IT & Society at http://www.stanford.edu/group/siqss/itandsociety/.

Scholars participating in SIQSS research programs and activities are drawn from diverse disciplines throughout Stanford University and from other academic institutions. SIQSS currently supports quantitative research through the following: long-term institute-initiated research programs, Stanford faculty research grants and student research assistantships, Stanford faculty fellows, interdisciplinary seminars, and the American Empirical Series.

STANFORD LINEAR ACCELERATOR CENTER

Director: Persis Drell
Web Site: http://www.slac.stanford.edu/

The Stanford Linear Accelerator Center (SLAC) has two academic departments. The Particle and Particle Astrophysics Department includes several areas of research: theoretical and experimental elementary particle physics, particle astrophysics, cosmology, accelerator and beam physics, and detector instrumentation. The Photon Science Department includes all areas of science done at the Stanford Synchrotron Radiation Laboratory (SSRL), the Photon Ultrafast Laser Science and Engineering Center (PULSE), and Linac Coherent Light Source, currently under construction to become a state-of-the-art X-ray laser research facility.

SLAC is located on 425 acres of Stanford property west of the main campus and is operated under a contract with the United States Department of Energy. SLAC is operated by Stanford as a national facility allowing qualified scientists from Stanford and other universities and research centers worldwide to participate in the research programs. Graduate students at Stanford may carry out Ph.D. research with members of the SLAC faculty; graduate students from other universities also participate in the research programs of visiting groups.

Research assistantships are available for qualified Stanford students by arrangement with individual faculty members. There are also opportunities for summer employment in the research groups at the center. Students interested in research in the areas of high energy physics, particle astrophysics, and accelerator physics should first contact Professor Rafe H. Schindler at the SLAC Graduate Studies Office. Students interested in research opportunities in photon science and SPEAR 3 should contact a member of the SSRL faculty, or other members of the Stanford faculty who use SSRL in their research programs; see http://www.ssrl.slac.stanford.edu/faculty/.

STANFORD SYNCHROTRON RADIATION LABORATORY (SSRL)

Director: Joachim Stöhr
Web Site: http://www-ssrl.slac.stanford.edu

SSRL, a division of the Stanford Linear Accelerator Center, is a National User Facility which provides synchrotron radiation, a name given to x-rays or light produced by electrons circulating in a storage ring at nearly the speed of light. These extremely bright x-rays can be used to investigate forms of matter ranging from objects of atomic and molecular size to man-made materials with unusual properties. The obtained information and knowledge is of great value to society, with impact in areas such as the environment, future technologies, health, and national security. Many of SSRL's 22 faculty hold joint appointments with campus departments.

SSRL has research programs in materials science, chemistry, structural biology, and ultrafast science, as well as accelerator physics and development of advanced sources of synchrotron radiation, especially ultra short pulse, x-ray free electron lasers. The lab is interdisciplinary with graduate students pursuing degrees from Stanford campus departments that include Applied Physics, Chemical Engineering, Chemistry, Earth Sciences, Electrical

Engineering, Materials Science and Engineering, Physics, and Structural Biology.

Students interested in working at the facility should contact a member of the SSRL faculty, one of the assistant directors, or other members of the Stanford faculty who use SSRL in their research programs; see http://www-ssrl.slac.stanford.edu/faculty/.

W. W. HANSEN EXPERIMENTAL PHYSICS LABORATORY (HEPL)

Director: Blas Cabrera
Deputy Director: Mark Kasevich
Office: Via Palou at Via Pueblo
Mail Code: 94305-4085
Phone: 650-723-0100
Fax: 650-725-8311
Web Site: http://hepl.stanford.edu

HEPL is an independent laboratory celebrating over 50 years of fundamental science and engineering research. HEPL faculty and students are engaged in research in accelerator physics, astrophysics, dark matter in the universe, free electron lasers, fundamental tests of relativity in space, gamma ray observations, gravitational wave detection, quantum condensed matter, and space based solar physics studies. Many of the programs involve satellite-based studies in fundamental physics and engineering.

WOODS INSTITUTE FOR THE ENVIRONMENT

Directors: Jeffrey R. Koseff, Barton H. Thompson, Jr.
Institute Office: Yang and Yamazaki (Y2E2), 473 Via Ortega
Mail Code: 94305-4205
Phone: (650) 736-8668
Web Site: http://woods.stanford.edu

The Woods Institute for the Environment harnesses the expertise of academics and decision makers to create practical solutions for people and the planet by sponsoring research that leads to solutions to global environmental sustainability issues; infusing science into policies and practices of the business, government, and NGO communities; developing environmental leaders for today and the future; and serving as catalyst and hub for the University's interdisciplinary work in environmental research, education, and action.

The Woods Institute focuses on thesecore areas: fresh water; climate and energy; land use and conservation; oceans and estuaries; and the sustainable built environment.

The Woods Environmental Venture Projects (EVP) program provides seed funding to interdisciplinary teams of Stanford faculty for innovative work in the core research areas. The institute also offers training in leadership and communications skills through the Leopold Leadership Program and other faculty training efforts.

Through its Strategic Collaborations and Uncommon Dialogues, the institute brings together faculty with leaders from the private and public sectors to develop pragmatic solutions to major environmental challenges. Three strategic collaborations have been established in partnership with other organizations: the Natural Capital Project (partners: The Nature Conservancy and World Wildlife Fund); the Center for Ocean Solutions (partners: Monterey Bay Aquarium and MBARI); and the Program on Food Security and the Environment (partner: Freeman Spogli Institute for International Studies). Special workshops are held regularly on key environmental issues such as biofuels, climate change policy, the U.S. Farm Bill, Pacific salmon, and carbon offsets. During the academic year, the Woods Institute also sponsors public events, including the Energy Seminar and the Environmental Forum, which are open to the Stanford community.

Through this and other work, the Woods Institute is helping to ensure that we can meet the needs of not only the current generation but of generations to come.

Undergraduate Programs—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 institute sponsors the University-wide Goldman Interschool Honors Program in Environmental Science, Technology, and Policy.

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.

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.html.

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/hours.

In support of the University's academic mission, Academic Computing provides technology expertise, resources and services to students and faculty. Academic Computing provides information on the use of technology in teaching and learning environments; operates and manages classrooms and public and multimedia computer clusters in Meyer Library and a computer cluster in Tresidder; provides faculty-specific computing resources through the Academic Technology Specialist program and Academic Technology Lab; provides technology support to Stanford University Libraries' services; operates and manages residential computing clusters and services; and supports CourseWork, Stanford's course management system.

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 group of SULAIR and provides study, multimedia, consulting, and instructional support services. In addition, Meyer Library houses the University's Digital Language Lab, computer clusters, technology enhanced classrooms, the Academic Technology Lab, and the central offices of Student Computing and Academic Computing.

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.

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
Stanford Linear Accelerator Center 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
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 for the 2008-09 academic 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 and German), Jay Bhattacharya (Medicine), Eamonn Callan (Education), Gerry Dorfman (Hoover Institute and Political Science), Arnold Eisen (Religious Studies), Michele Elam (English), Martin Evans (English), Paula Findlen (History), Larry Friedlander (English), Kenneth Fields (English), Hester Gelber (Religious Studies), Albert Gelpi (English), Barbara Gelpi (English), Monika Greenleaf (Slavic Languages), Robert Gregg (Religious Studies), Tom Grey (Music), Hans Ulrich Gumbrecht (French and Italian), Van Harvey (Religious Studies), Charles Junkerman (Continuing Studies Program), Nancy Kollmann (History), Marsh McCall (Classics), Mark Mancall (History), Joseph Manning (Classics), Diane Middlebrook (English, emeritus), Thomas Moser (English), David Palumbo-Liu (Comparative Literature), Linda Paulson (English), Denis Phillips (Education, and, by courtesy, Philosophy), Jack Rakove (History), Ronald Rebholz (English), Rush Rehm (Drama), John Rick (Anthropological Sciences), John Rickford (Linguistics), Paul Robinson (History), Ramón Saldívar (English), Paul Seaver (History), Thomas Sheehan (Religious Studies), Robert Siegel (Microbiology and Immunology), Peter Stansky (History), Stephen Stedman (Freeman Spogli Institute for International Studies, and, by courtesy, Political Science), Thomas Wasow (Linguistics), Ernlé Young (Center for Biomedical Ethics), Steven Zipperstein (History)
Program Offices: 482 Galvez Mall
Mail Code: 94305-6079
Phone: (650) 725-0061
Email: mlaprogram@stanford.edu
Web Site: http://mla.stanford.edu

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, there is a three quarter foundation course 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, new students take the core introductory seminar, The Plague: An Introduction to Interdisciplinary Graduate Study. This seminar aims to prepare 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 theses 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
Director of Admission and Student Services: Teresa Nishikawa
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.

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
Web Site: http://www.stanford.edu/dept/vpsa/

Student Affairs supports the academic mission of the University by fostering a climate conducive to living and learning in a diverse community. The division encompasses programs and services for undergraduates and graduate students which include the Office of Residential Education, the University Registrar, the Vaden Health Center, the Career Development Center, the Office of Accessible Education, the Graduate Life Office, 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 the 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.

DEAN OF STUDENT LIFE

Dean of Student Life: Chris Griffith
Office: Tresidder Memorial Union
Phone: (650) 723-2733
Web Site: http://www.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, the Office of Student Activities, Student Unions, Judicial Affairs, and ASSU administrative staff. 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: Tresidder Memorial Union
Phone: (650) 725-1808
Web Site: http://www.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, the Women's 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. 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://www.stanford.edu/group/OAE/

The Office of Accessible Education provides services and resources to students with disabilities through its four primary centers.

STUDENT DISABILITY RESOURCE CENTER (SDRC)

The SDRC coordinates academic and other accommodations for undergraduates and graduate students who have disabilities including mobility impairments, chronic illness, sensory disabilities, learning disabilities, and psychological disabilities. The center's goal is to enable students with disabilities to participate fully in the educational experience at Stanford while meeting the academic standards maintained by the university.

In accordance with the provisions of the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973, the SDRC offers an array of accommodations and auxiliary aids and services to students with documented disabilities. Direct support services include, but are not limited to, notetaking, Brailling, oral or sign language interpretation, stenocaptioning, books on tape or electronic text, examination accommodations, and special housing arrangements. During the academic year, the SDRC runs a golf cart service called DisGo Cart for use by students who have temporary and permanent mobility impairments or who use a wheelchair. To arrange for an on-campus ride call 725-2484 (5-CHUG).

ASSISTIVE LEARNING TECHNOLOGY CENTER (ALTEC)

ALTeC is the technology arm of the Office of Accessible Education providing resources to make information technology and education more accessible for those with disabilities. Students can access assistive technology software such as screen magnification, speech recognition, text-to-speech screen readers, and graphic outliners from any of the computing clusters in Meyer, Tresidder, and the residences, as well as the Lane and SSRC Reading Rooms in Green Library.

ALTeC's Alternative Format Production Facility (AFPF) converts printed text to computer files (e-text), large print, or Braille using high-speed scanners and Braille embossers. The Equipment and Software Loan Library (EaSLL) allows students to borrow certain assistive technology for evaluation purposes.

ALTeC's services are available to eligible students, faculty, and staff who need assistance due to a disability. Students should contact the SDRC at (650) 723-1066 for more information. Faculty and staff should contact Stanford's ADA/504 Compliance Officer at (650) 723-0755 for a referral.

SCHWAB LEARNING CENTER

The Schwab Learning Center offers enhanced services for students with learning differences (LD) and attention deficit hyperactivity disorder (ADHD) including screening assessments for learning differences, individual learning strategy sessions, and tutoring in academic disciplines.

CENTER FOR UNIVERSAL DESIGN IN EDUCATION

Application of the principles of universal design for instruction (UDI) represents a new approach to teaching that promotes proactive design and use of inclusive instructional practices that benefit all students. The center seeks to advance the development of instructional methods, tools, and strategies that are flexible, customizable, and accessible to students from different backgrounds, learning styles, abilities, and disabilities in a variety of learning contexts.

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, 9 a.m. to 12 noon, 1 p.m. to 3 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://www.stanford.edu/group/a3c/
- Black Community Services Center: http://www.stanford.edu/dept/BCSC/
- El Centro Chicano: http://www.stanford.edu/dept/elcentro/
- LGBT Community Resources Center: http://lgbt.stanford.edu/
- Native American Cultural Center: http://www.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
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 program in the residences serves 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: 94305-8620
Phone: (650) 723-0992
Web Site: http://haas.stanford.edu

The Haas Center for Public Service connects academic study with community and 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 one associated program, 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://www.stanford.edu/dept/icenter/

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 social, cultural, and educational programs, I-Center facilities are used 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

In March 1996, President Gerhard Casper convened the Committee of 15 and requested a review of the student judicial system at the University under the then-existing Legislative and Judicial Charter of 1968. During the following year, the Committee of 15 conducted an extensive review of the existing charter and process and drafted a new charter to take its place. 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 . 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 primary codes of conduct for students are the Fundamental Standard and Honor Code.

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://www.stanford.edu/dept/vpsa/judicialaffairs/guiding/honorcode.int.htm. 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), Tresidder Meeting Services, and the Office for Religious Life. It also houses a multifaith 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 Program.

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 that 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) 723-1171.

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, the ASSU, and sororities and fraternities through publications, workshops, one-on-one consultation, and major event planning support. The OSA also provides fundraising expertise for student groups and leadership opportunities for students.

VOLUNTARY STUDENT ORGANIZATIONS

At its March 1963 meeting, the Board of Trustees adopted the following policy:

"Students are encouraged to study, discuss, debate, and become knowledgeable about contemporary affairs. Expressing opinions or taking positions with respect to these matters is up to the individual students or to volunteer groups of students so constituted that they are authorized to speak for their members. This is not a function of student government at Stanford.

"All students are required to become members of the Associated Students of Stanford University, which represents them with respect to student affairs on the Stanford campus. The student government, under this policy, is not authorized to speak for students on other matters.

"Under such regulations as may be established from time to time by the President of the University, students may form voluntary organizations constituted to speak for their members with respect to matters outside the scope of student government, provided such organizations clearly identify themselves and, in any public statements, make it clear that they do not represent or speak for the University or the Associated Students.

"Any questions concerning the interpretation and application of this policy shall be resolved by the President of the University."

Voluntary student organizations 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 food services; meeting rooms; a ticket office; a campus information center; a convenience store; banking and credit union offices with ATMs; a fitness center; and a hair styling shop.

TMU is also the home of several administrative offices: Judicial Affairs, Dean of Student Life, Residential Education, the Student Services 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 (without charge) 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 may apply): allergy injections, immunizations, travel services, physical exams for employment and scholarships, HIV testing, laboratory, X-rays, pediatric immunizations (academic year only), 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 (without charge) 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 The Chickering Group, an Aetna Company (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://www.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 Track House Sports Shop, (650) 327-8870, at the corner of Campus Drive and Galvez Street, 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://www.stanford.edu/dept/diversityaccess

The Diversity and Access Office has two primary missions:

1. To oversee University compliance with nondiscrimination and equal opportunity laws as well as the regulations relating to affirmative action. This includes collecting, monitoring, reporting, and analyzing major 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 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
Mail Code: 94305-8200
Email: rasch@stanford.edu
Web Site: http://www.stanford.edu/dept/ombuds
School of Medicine Ombuds: Keith Smith
Email: keith.smith@stanford.edu

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://www.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 students 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 of 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.

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.

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 writing 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 (GER) 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, NH, 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.

Students who 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) 642-7602.

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://www.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 leading to active duty reserve commissions in the U.S. Navy or U.S. Marine Corps. 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://navsci.berkeley.edu.

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 in 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 computer science, 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

UNIVERSITY POLICIES

NONDISCRIMINATION POLICY

Stanford University admits students of either sex and any race, color, religion, sexual orientation, or national and ethnic origin 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 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, 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/ocr/access/student.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 Student Disability Resource Center at http://www.stanford.edu/group/DRC/.

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) 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:

A. Disagreements regarding a requested service, accommodation, or modification of a University practice or requirement;
B. Inaccessibility of a program or activity;
C. Harassment or discrimination on the basis of disability;
D. Violation of privacy in the context of disability.

For disputes regarding certain specific academic accommodations or modification of academic requirements (such as reduction in the number of academic course units taken quarterly or yearly, requests for substitution of courses, or issues relating to academic standing), the alternate procedure set forth in Section V (C) of the Stanford University Policy and Procedure for Student Requests for Services and Accommodations should be followed. For questions regarding which procedure is applicable, contact the Compliance Officer at the Diversity and Access Office.

These two sets of procedures supplant the Statement on Student Academic Grievance Procedures (set forth in the *Stanford Bulletin*) for disability-related grievances.

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. The office is located in 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).

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.

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 shall 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 shall be filed 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), equal.opportunity@stanford.edu (email).
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") shall 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 shall 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 Compliance 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). The final report shall 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 Compliance Officer shall 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 Compliance 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 Compliance 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 Compliance 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), equal.opportunity@stanford.edu (email).

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 shall forward 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 one which a person in the position of the decision maker might reasonably have made?

A copy of the Provost's written decision will be expected within 30 calendar days of the filing of the appeal and shall 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). 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 Special Counselor to the President for Campus Relations and 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 Title IX Compliance Officer, the Special Counselor to the President for Campus Relations, Building 170, Main Quad, Stanford University, Stanford, CA 94305-2100; (650) 725-8395 (voice), (650) 723-1216 (TTY), (650) 725-3577 (fax). 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 and 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 Title VI Compliance Officer, 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 Statement on Academic Grievance Procedures (see 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 students of either sex and any race, color, religion, sexual orientation, or national and ethnic origin 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 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, 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 undergraduate 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. This is 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. A delay in filing a grievance may be grounds for rejection of that grievance.

c. The Director shall 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) shall issue his or her decision in writing, and take steps to initiate such corrective action as is called for (if any). Conduct meriting discipline shall 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).

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) and the School of Medicine's Ombuds (http://www.med.stanford.edu/ombuds) are available to discuss and advise on any matters of University concern and frequently help expedite resolution of such matters. Although they have no decision making authority, the Ombuds' Offices have wide powers of inquiry.

d. *Sexual Harassment*—For further information and resources concerning sexual harassment, students should refer to the web page of the Sexual Harassment Policy Office at http://harass.stanford.edu.

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 Provost's Copyright Reminder, http://www.stanford.edu/dept/ucomm/provost/copyright_reminder.html. 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), 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.

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
- The Medical Center Ombudsperson, http://www.med.stanford.edu/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, whether 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 University or Medical School ombudspersons. 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 occuring 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 the Stanford 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, providing that the victim agrees in advance, in writing, to treat this information as confidential. The offices of the Dean of Students are available to help student victims deal with academic difficulties that may arise because of the victimization and its impact.

Information Requests and Confidentiality—The University offices responding to charges of sexual assault have established protocols for protecting confidentiality 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, the availability of mediation, 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 Stanford Events at (650) 723-2551, http://stanfordevents.stanford.edu. Note that other venues on campus (such as White Plaza) are made available 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 the Office of Student Activities at (650) 723-2733, http://www.stanford.edu/dept/OSA.

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://osa.stanford.edu/publications/soh/2002-2003/
b. Registrar's Scheduling Office: phone (650) 723-6755, or see http://registrar.stanford.edu/event/.
c. The Office of Stanford Events: phone (650) 723-2551, 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.

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 University Bursar 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 a 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 trainings 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 Office of Student Activities at Tresidder Memorial Union: provides workshops and training, publications, and party planning consultations. Web site: http://www-leland.stanford.edu/dept/OSA/party/ (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.

Some examples of hazing activities or events may be found at http://osa.stanford.edu/publications/soh/critical_policies--hazing.shtml. 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/.

Applicability—This policy applies to all academic and administrative units of Stanford University, including SLAC, and all campus student housing. This policy does not supercede 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.

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 CONFIDENTIAL DATA

Stanford University maintains confidential data including Social Security numbers, financial information, health information, and student records. It is incumbent on every member of the Stanford community with lawful access to confidential data to protect it. Confidential data in electronic form should be encrypted and should not be stored locally on desktop machines or laptops. Members of the Stanford community should 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://police.stanford.edu/index2.html.

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