ECONOMICS

Emeriti: (Professors) Takeshi Amemiya, 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: Timothy F. Bresnahan

Professors: 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, Thomas E. MaCurdy, Paul R. Milgrom, John H. Pencavel, Joseph Romano, Ilya Segal, John B. Shoven, Robert Staiger, John B. Taylor, Frank Wolak, Gavin Wright

Associate Professors: Liran Einav, Jonathan Levin, Luigi Pistaferri

Assistant Professors: Ran Abramitzky, Manuel Amador, Nicholas A. Bloom, Giacomo DeGiorgi, Doireann Fitzgerald, Peter Hansen, Matthew Harding, Nir Jaimovich, Seema Jayachandran, Jakub Kastl, Aprajit Mahajan, Kalina Manova, Petra Moser, Muriel Niederle, Michele Tertilt

Senior Lecturer: Geoffrey Rothwell

Lecturers: Doru Cojoc, Ward Hanson, Michael Lovenheim, Gregory Rosston, 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, Rosamond Naylor, Bruce Owen, A. Mitchell Polinsky, Peter C. Reiss, D. John Roberts, James Strnad, Barry Weingast, Robert Wilson

Visiting Professors: Edward Miguel, Ernesto Shargrodsky, Jurgen Schroeder

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Courses given in Economics have the subject code ECON. For a complete list of subject codes, see Appendix B.

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 represent a wide spectrum of interests and conduct research on a broad range of topics. Most fields of economics are covered, 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
BACHELOR OF ARTS

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 (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.

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* 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.

MINORS (35 UNITS)

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.
4. ECON 50 (5 units, grade of 'B' or better): basic price theory. Prerequisites: ECON 1A and MATH 51 (letter grade required).
3. 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.

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* 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 3), 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 under items 4 and 5.

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.

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.

GRADUATE PROGRAMS

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.

MASTER OF ARTS

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

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.

It is expected that the student meet, and indeed exceed, the above standards by the beginning 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 second 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 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 $\frac{1}{3}$ semester (5 quarter) hours in the case of the M.A. and 6 $\frac{2}{3}$ 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/.

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.

Applications should be submitted before January 1 to the department admissions committee.

COURSES

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

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 (Makler, C), Sum (Staff)

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 (Cojoc, D), Sum (Staff)

ECON 11N. Understanding the Welfare System—Stanford Introductory Seminar. Preference to freshmen. Welfare reform legislation and the devolution revolution. The transfer of responsibility for antipoverty programs to the states. How recent reforms change the welfare system and who is likely to be affected. Food stamps, AFDC, TANF, SSI, and Medicaid. Income transfer programs such as earned income tax credit and income taxes, and labor market regulations such as minimum wages and overtime rules. Economic principles to understand the effectiveness of these programs and their consequences on the behavior of families. Pre- or corequisite: ECON 1. Recommended: basic understanding of labor markets, taxes, and transfers.
2 units, Aut (MaCurdy, T)

ECON 17N. Energy, the Environment, and the Economy—Stanford Introductory Seminar. Preference to freshmen. The relationship between environmental quality and production and consumption of energy. Can environmentally-friendly energy production and consumption compete with conventional sources? How to estimate and compare environmental impact costs of nonrenewable sources such as fossil fuels and nuclear power versus renewable sources such as solar and wind power. Implicit subsidies in conventional energy sources and the environmental costs of these subsidies. Regulatory and legal barriers to more environmentally friendly energy sources.
2 units, Spr (Wolak, F)

ECON 50. Economic Analysis I—Individual consumer and firm behavior under perfect competition. The role of markets and prices in a decentralized economy. Monopoly in partial equilibrium. Economic tools developed from multivariable calculus using partial differentiation and techniques for constrained and unconstrained optimization. Prerequisites: 1 or 1A and MATH 51. GER:DB-Math
5 units, Aut (Abramitzky, R), Spr (Tendall, M), Sum (Staff)

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 (Staff)

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. The role of macroeconomic policies in the short and long run. Prerequisites: 1B, 50.
5 units, Win (Jaimovich, N), Spr (Klenow, P), Sum (Staff)

ECON 90. Introduction to Financial Accounting—(Graduate students register for 190.) How to read, understand, and use corporate financial statements. Oriented towards the use of financial accounting information (rather than the preparer), and emphasizes the reconstruction of economic events from published accounting reports.
5 units, Aut (Beyer, A), Win (Stanton, F)

ECON 91. Introduction to Cost Accounting—(Graduate students register for 191.) The use of internal financial data for managerial decision making.
5 units, Spr (Stanton, F)

ECON 93Q. Global Capital Markets—Stanford Introductory Seminar. Preference to sophomores. Focus is on the operation of stock markets in the U.S.: the New York and American stock exchanges, and the over-the-counter NASDAQ market, on which high-tech companies are traded. Financial institutions in the U.S. (stock markets, mutual funds) and how they relate to international markets. Inflation, interest-rate trends, U.S. government agencies, and the impact of the Federal Reserve Bank on capital markets and capital flows. Macroeconomic factors that drive capital flows.
3 units, Win (Marotta, G)

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 (Cojoc, D; Angelucci, M), Win (Steiner, F; Rothwell, G; Cojoc, D), Spr (Rosston, G; Clerici-Arias, M; 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, 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. Students complete individual projects and core material. Topics vary with the instructor. Limited enrollment. Prerequisites: 52, 102B.

5 units, Win (Bloom, N)

ECON 105. Economic Forecasting—Theory and econometric techniques for forecasting macroeconomic and financial time series. Topics include: objectives for forecasting; optimal forecast with economic loss functions; forecast evaluation and comparison; optimal combination of multiple forecasts; time-series models including ARMA and ADL; and empirical applications with macroeconomic and financial time series. Linear algebra and multivariate calculus are used. Prerequisites: 50, 102B.

5 units, Spr (Hansen, P)

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, not given this year

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 (Staff)

ECON 113. Technology and Economic Change—The economic causes and consequences of technological change. The historical experience of advanced industrial countries and the more recent experience of less developed economies. Topics: the origins of modern industry in the U.S. and Europe, technology and the growth of large-scale organizations, late-comers to industrialization (Japan and newly industrializing countries), economic growth and slowdown in mature industrial countries, and present concerns and future prospects (the influence of technology on employment, civilian spillover from military R&D, and coping with rapid technological change).

5 units, not given this year

ECON 114. Economy and Economics of Ancient Greece—Introduction to the history of Greek civilization from the Mycenaean period to the 4th century B.C. The formalist-substantivist controversy: what behavioral assumptions should be made in order to understand the working of the Athenian economy. The economics and ethical thoughts of Plato and Aristotle in contrast to utilitarianism, which became a foundation of modern economics. Prerequisite: 1. GER:EC-GlobalCom

5 units, Win (Amemiya, T)

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. Prerequisite: 51. GER:DB-SocSci

5 units, Win (Chaudhary, L)

ECON 116. American Economic History—From colonial times to the present. The application of economic analysis to historical issues, and the role of historical context in economics. Topics: American economic growth in international perspective; the economics of slavery and regional divergence; the origins and consequence of the American system of technology and business organization; 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, not given this year

ECON 118. Development Economics—The economic problems and policy concerns of developing countries. Theories of growth and development; inequality and poverty; credit and labor markets; health and education; politics and corruption. Emphasis is on economic models 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.

5 units, Win (Schargrodsky, E)

ECON 123. Regulation and Competition in Latin America—The economics and workings of public intervention and control of markets in Latin America. 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; and antitrust with a weak judiciary.

5 units, not given this year

ECON 124. Contemporary Japanese Economy—Comparative and historical perspective. Micro and institutional aspects, such as firms, the employment system, corporate governance and financial institutions, and the macro economy. 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 BIO-MEDIN 156/256.) 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. Prerequisite: ECON 50 and ECON 102A or equivalent statistics, or consent of instructor. Recommended: ECON 51.

5 units, Aut (Bhattacharya, J)

ECON 127. Economics of Health Improvement in Developing Countries—(Same as HUMBIO 121, 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: background in economics and statistics, and consent of instructor.

5 units, not given this year

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. Major corporate financial instruments including debt, equity, and convertible securities. Equivalent to core MBA finance course, FINANCE 220. Prerequisites: 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. Auctions and Market Design—Competitive bidding for asset purchases and procurement of industrial needs; bidder entry decisions; design of mechanisms for complicated resource allocation problems. Prerequisites: 51, 160.

5 units, Win (Milgrom, P)

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, Win, Spr, 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, Win (Kurz, M), Spr (Shoven, J), Sum (Staff)

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 (Cojoc, D)

ECON 142. Public Economics Seminar—Topics vary annually; examples include social security, tax reform, and economic policy reforms. Students prepare a memorandum to a senior economic policy official on the class topic. Limited enrollment. Prerequisites: 141 and consent of instructor.

5 units, Win (Boskin, M)

ECON 143. Ethics in Economics Policy—Ethical decision theory from an economist's viewpoint. Formulating objectives for economic policy. The role of markets in an economic system. Concepts of equity, efficiency, and rights. Measuring economic performance. The benefits and costs of market liberalization. Prerequisites: 50, 51, and 102A.

5 units, not given next year

ECON 145. Labor Economics—Analysis and description of labor markets. Determination of employment, unemployment, hours of work, wages. Welfare programs and work effort. Wage differentials by schooling, experience, gender, and race. Economics of discrimination. Earnings inequality and changes in inequality. Employment contracts, labor unions, and bargaining. International comparisons. Prerequisites: 50, 51, 102B. GER:EC-Gender

5 units, Aut (DeGiorgi, G)

ECON 146. Economics of Education—Topics may include theories on school choice, the rise in costs of higher education, and the use of incentives to improve student achievement.

5 units, Spr (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, not given this year

ECON 149. Modern Firm in Theory and Practice—Theoretical and institutional analysis of modern corporate firms: industrial relational, motivational, financial, information structural, managerial, and legal. The role of various hybrid institutional forms between the market and the integrated firm: subcontracting, franchising, R&D cooperatives, and consortia. Practices in American, W. European, and Japanese firms. Prerequisite: 51.

5 units, not given this year

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 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, Aut (Hanson, W)

ECON 154. Economics of Legal Rules and Institutions—(Same as PUBLPOL 106.) The design and consequences of legal rules. Common ideas that run through law including individual rationality, economic efficiency, conventional and Coasian analyses of externalities, enforcement, costs, and market consequences of legal restrictions on contract terms. Private versus public enforcement of law; the tradeoff between certainty and severity of punishment; the choice between ex post and ex ante sanctions; and the choice between property and liability rules. Applications to property, intellectual property, contract, criminal, tort, family, and environmental law. Prerequisite: ECON 50.

5 units, Aut (Owen, B)

ECON 155. Environmental Economics and Policy—(Same as EARTH-SYS 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 (Goulder, L)

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 (Staff)

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 (Steiner, F)

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, Win (Cojoc, D)

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 next year

ECON 164. Current Issues in International Economics Law and Policy—(Same as LAW 357.) Legal architecture of the World Trade Organization system; questions about its design and wisdom. Economics and politics of international cooperation on trade. The WTO as an institution and its core obligations. Topics may include: choice between regional and global approaches to trade cooperation; interface between international trade obligations and domestic regulation of health, safety, and environment; regulation of subsidies; design and operation of dispute settlement system; and special and differential treatment of developing countries. Prerequisite: 51 or equivalent.

5 units, Win (Staiger, R)

ECON 165. International Trade and Finance—Comparative advantage in production and trade among nations; trade policy; increasing returns, imperfect competition and trade; the international monetary mechanism; domestic monetary, fiscal, and exchange rate policies and their relationship to foreign trade; global financial crises and trade. Prerequisites: ECON 1A,B or 1, and 51, 52.

5 units, Aut (Fitzgerald, D), Win (Staiger, R), 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; trade policy; international trade agreements; theory and evidence.

5 units, Spr (Staff)

ECON 167. European Monetary and Economic Integration—The economics of the European Community and the internal market. Analysis of current competition, transportation, and factor market policies, including the problems of agriculture and unemployment. Fiscal harmonization and mercantilist rivalry. European Monetary Union (EMU): genesis, implementation, and consequences of a common currency and central bank. Foreign exchange and foreign trade. Prerequisites: 51, 52, or equivalents.

5 units, Win (Staff)

ECON 168. International Finance and Exchange Rates—(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, Aut (McKinnon, R)

ECON 169. International Financial Markets and Monetary Institutions—(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—(Graduate students register for 270.) Probability, random variables, and distributions; large sample theory, theory of estimation and hypothesis testing. Limited enrollment.

5 units, Aut (Hansen, P; Mahajan, A)

ECON 171. Intermediate Econometrics II—(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—(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, Win (MaCurdy, T)

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, Spr (Niederle, M)

ECON 181. Optimization and Economic Analysis—The development of optimization techniques, including calculus, linear and nonlinear programming, the calculus of variations, and control theory. Emphasis is on concepts and results rather than techniques and proofs. Examples: static and dynamic theories of the household and the firm, and problems in aggregative planning and control. Prerequisites: 51 and 102A, and MATH 51 or equivalent.
5 units, not given next year

ECON 190. Introduction to Financial Accounting—(Same as 90; see 90.)
5 units, Aut (Beyer, A), Win (Stanton, F)

ECON 191. Introduction to Cost Accounting—(Same as 91; see 91.)
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. Seniors working on their theses also may enroll and present their research to the seminar participants. Seniors are required to make substantial progress on their thesis by the end of the quarter. Enrollment limited to 25.
5 units, Win, 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, Win (Rothwell, G), Spr, Sum (Staff)

PRIMARILY FOR GRADUATE STUDENTS

ECON 239D. Directed Reading—May be repeated for credit.
1-10 units, Aut, Win, Spr, Sum (Staff)

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.
1-10 units, Aut, Win, Spr, Sum (Staff)

ECON 400. Ph.D. Dissertation
1-15 units, Spr (Staff)

A. CORE ECONOMICS

ECON 202. Core Economics: Modules 1 and 2—(Non-Economics graduate students register for 202N.) Open to advanced undergraduates with consent of instructors. Theory of the consumer and the implications of constrained maximization; uses of indirect utility and expenditure functions; theory of the producer, profit maximization, and cost minimization; behavior under uncertainty; partial equilibrium analysis and introduction to models of general equilibrium. Limited enrollment. Prerequisite: thorough understanding of the elements of multivariate calculus and linear algebra.
2-5 units, Aut (Bresnahan, T; 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 (Staff)

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 (Milgrom, P)

ECON 203N. 203 For Non-Economics Ph.D. Students
2-5 units, Win (Staff)

ECON 204. Core Economics: Modules 9 and 10—The theory of contracts, emphasizing contractual incompleteness and the problem of moral hazard. Incentive regulation. Competition with imperfect information, including signaling and adverse selection. The theory of resource allocation over time, competitive equilibrium, and intertemporal efficiency. Limited enrollment. Prerequisite: 203.
2-5 units, Spr (Jackson, M)

ECON 210. Core Economics: Modules 3 and 7—Dynamic economics applied to aggregate economic fluctuations and economic growth. Solving dynamic, stochastic rational expectation models using discrete time dynamic programming. Growth theory (neoclassical models, growth accounting, technical change, endogenous growth) using optimal control theory. Limited enrollment.
2-5 units, Aut (Jaimovich, N)

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 (Amador, 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)

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; McClellan, M; Bloom, N)

ECON 310. Macroeconomic Workshop
1-10 units, Aut (Hall, R; Klenow, P; Taylor, J; Kurz, M; Amador, M; Jaimovich, N), Win (Hall, R; Klenow, P; Taylor, J; Jaimovich, N; Tertilt, M; Amador, M; Kurz, M), Spr (Hall, R; Klenow, P; Taylor, J; Kurz, M; Amador, M; Jaimovich, N)

B. ECONOMIC DEVELOPMENT

To receive credit for this field, students must complete 214 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.

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—The historical experience of economic development; patterns of economic growth; sources of economic growth; models of economic development (two-gap models, dual economy models, open economy models, new growth models), savings and capital accumulation; the role of money and finance; inflation; taxation; stabilization in closed and open economies with incomplete and/or imperfect markets; human and other forms of intangible capital; infrastructural capital and externalities; income distribution; numerical general equilibrium models.
2-5 units, Win (DeGiorgi, G)

ECON 217. Development Economics III—Banking systems, interest rates, regulatory policies, and productivity of capital in developing countries. Controlling inflation: fiscal and monetary policies for macroeconomic stability. Currency crises, exchange rates, and liberalization of foreign trade. Applications to transitional socialist economies in Asia and E. Europe.
2-5 units, not given this year

ECON 220. Political Economy I—Positive and normative theories of political economy. Positive topics include direct democracy, electoral competition, legislative policy making, agenda setting, lobbying, comparative constitutions, and intergenerational politics, with applications to income taxation, redistribution, and the size of government. Normative topics include social choice theory with and without interpersonal comparisons, Pareto efficiency with public goods, potential Pareto improvements, welfare measurement, cost benefit analysis, and analysis of economic policy reform.
2-5 units, Win (Jackson, M)

ECON 221. Political Economy II—Continuation of 220. Positive and normative theories of political economy. Focus is on how the structure of political institutions affect societal welfare and economic outcomes. Topics include: measurement of the welfare of a society; constitutional design; models of strategic voting behavior; asymmetries of information and voting behavior; lobbying, vote buying, and political influence; the politics of federations of states; and political decision making regarding economic policies such as taxes, redistribution, and public good provision. Prerequisite: 220.
2-5 units, Spr (Harding, M)

ECON 315. Development Workshop
*1-10 units, Aut (Mahajan, A; Jayachandran, S),
Win (Jayachandran, S; Mahajan, A; DeGiorgi, G),
Spr (DeGiorgi, G; Mahajan, A; Jayachandran, S)*

C. 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.

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, Win (David, P)

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, not given this year

ECON 226. U.S. Economic History—The American economy from colonial times to the present. The role of economic history as a distinctive intellectual approach to the study of economics. Topics: American growth record and its determinants, the origins and character of U.S. technology, slavery, the Great Depression, recent U.S. performance in historical perspective.
2-5 units, Spr (Wright, G)

ECON 227. European Economic History—Economic growth and development in W. Europe from the 11th-20th centuries, emphasizing the formative period up to the 19th century. Emphasis is on the experiences of Britain, France, Germany, and Italy. The interrelations between the growth and distribution of output, demographic trends, technological and organizational changes in trade and industry, and the changing formal and informal institutions governing political and economic activity.
2-5 units, not given this year

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, Aut (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, Win (Abramitzky, R; Moser, P)

ECON 325A,B,C. Economic History Workshop
1-10 units, **A:** *Aut,* **B:** *Win,* **C:** *Spr (Greif, A; Wright, G; Abramitzky, R; David, P; Moser, P)*

D. MONETARY THEORY AND ADVANCED MACROECONOMICS

Requirements for this field are completion of 233 and 234.

ECON 233,234,235. Advanced Macroeconomics—Topics in the theory of fluctuations and growth.
2-5 units, **233:** *Aut (Amador, M; Jaimovich, N),* **234:** *Win (Klenow, P),* **235:** *Spr (Bloom, N)*

E. 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.

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 (Lovenheim, M)

ECON 243. Economics of Environment—Sources of environmental problems in market economies and policy options for addressing these problems. Topics: choice of policy instruments (taxes, standards, tradeable permits), environmental risk assessment, valuation of non-marketed commodities (environmental amenities, biodiversity), environmental policy making under uncertainty, the optimal mix of corrective and distortionary tax instruments, and the dynamics of economic growth in the presence of non-reproducible natural resources. Upper-division undergraduates require consent of instructor.

2-5 units, not given this year

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 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), Win, Spr (Boskin, M; Shoven, J)

F. ECONOMICS OF LABOR

To receive credit for this field, students must complete two from 246, 247, and 248.

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. Employment contracts and turnover. Models of labor union behavior. Bargaining. Worker-owned enterprises. Unemployment and mobility. International comparisons.

2-5 units, Aut (Pencavel, J)

ECON 247. Labor Economics II—The economics and econometrics of program evaluation. The impact of public policies on labor demand, labor supply, human capital, and wage determination. Social, natural, and quasi-experiments. Intertemporal consumption and labor supply decisions. Intra-family allocation models.

2-5 units, Spr (Pistaferri, L; Bloom, N)

ECON 345. Applications Workshop

1-10 units, Aut, Win, Spr (MaCurdy, T; Pencavel, J; Pistaferri, L; Wolak, F; Bloom, N; McClellan, M)

G. 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.

ECON 250A. Natural Resource and Energy Economics—First part of two course sequence. 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, 270, 271, and 272, or equivalents with consent of instructor.

2-5 units, not given this year

ECON 250B. Environmental Economics—Second of two course sequence. 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, 270, and 271, or equivalents with consent of the instructor.

2-5 units, not given this year

ECON 257,258. Economics of Industry—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, **257:** *Aut (Einav, L; Kastl, J),* **258:** *Win (Kastl, J; Wolak, F)*

ECON 260. Topics in Industrial Organization—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. Prerequisite: 257. Recommended: 258.

2-5 units, Spr (Bresnahan, T; Einav, L)

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, Win, Spr (Bresnahan, T; Einav, L)

H. 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.

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, Win (Staiger, R)

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, Spr (Manova, K)

ECON 268. International Finance and Exchange Rates—(Same as 168; see 168.)

5 units, Aut (McKinnon, R)

ECON 269. International Financial Markets and Monetary Institutions—(Same as 169; see 169.)

5 units, Spr (Taylor, J)

ECON 365. International Trade Workshop

1-10 units, Aut, Win, Spr (Lau, L; Wright, M; Fitzgerald, D; Staiger, R)

I. ECONOMETRICS

A student may satisfy the requirements for the econometrics field by completing the requirements of one of two subfields:

I-1: Theoretical Econometrics: To receive credit in the theoretical econometrics subfield, students must complete 273A and 273B.

I-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.

ECON 270. Intermediate Econometrics I—(Same as 170 see 170.)

5 units, Aut (Hansen, P; Mahajan, A)

ECON 271. Intermediate Econometrics II—(Same as 171; see 171.)

5 units, Aut (Wolak, F)

ECON 272. Intermediate Econometrics III—(Same as 172; see 172.)

2-5 units, Win (MaCurdy, T)

ECON 273. Advanced Econometrics I—Possible topics: parametric asymptotic theory. M and Z estimators. General large sample results for maximum likelihood; nonlinear least squares; and nonlinear instrumental variables estimators including the generalized method of moments estimator under general conditions. Model selection test. Consistent model selection criteria. Nonnested hypothesis testing. Markov chain Monte Carlo methods. 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 275. Time Series Econometrics—Stochastic processes and concepts such as stationarity, ergodicity, and mixing. Inference with heteroskedastic and autocorrelated time series; autoregressive and moving average models; unit root processes and asymptotic analysis of such; tests for structural change; vector autoregressive models; cointegration; impulse response analysis; forecasting; ARCH and GARCH volatility models. Prerequisites: 270, 271.

2-5 units, Spr (Hansen, P)

ECON 276. Limited Dependent Variables—(Formerly 274.) Possible topics: discrete choice models; Tobit models; duration models; semi-parametric 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 (Hong, H)

ECON 370. Econometrics Workshop

1-10 units, Aut (Hong, H; Hansen, P; Mahajan, A), Win (Hansen, P; Mahajan, A; Han, L), Spr (Hansen, P; Mahajan, A; Hong, H)

J. MICROECONOMIC THEORY

To receive credit for this field, students must complete two courses in one of the following two subfields:

J-1: General Theory: 280, 281, 284, 286, 287, 291
J-2: Decisions, Contracts and Incentives: 282, 283, 286, 289
Note: taking one course from each track does not satisfy the microeconomic theory field requirement.

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.

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. Market Design—(Same as MGTECON 602.) Analysis of rules that govern the operation of markets with and without the assistance of prices. Emphasis is on markets in which 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. Matching markets such as the National Resident Matching Program and airline slot exchanges, asset auctions such as the spectrum auctions, electricity markets, and Internet procurement services.

4 units, Spr (Niederle, M; Milgrom, P)

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 next 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.) Recent research papers on 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 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, Spr (Jackson, 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; Hammond, P; Kurz, M; Jackson, M; Athey, S), Win (Bernheim, D; Levin, J; Milgrom, P; Niederle, M; Segal, I; Jackson, M; Kurz, M), Spr (Bernheim, D; Levin, J; Milgrom, P; Niederle, M)

OVERSEAS STUDIES

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

BERLIN

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)

KYOTO

OSPKYOTO 215X. The Political Economy of Japan
4-5 units, Spr (Hayashi, T)

MOSCOW

OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia
5 units, Aut (Mau, V)

PARIS

OSPPARIS 91. Globalization and Its Effect on France and the European Union
5 units, Spr (Le Cacheux, J; Laurent, E)

OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead
5 units, Aut (Le Cacheux, J)

SANTIAGO

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 (Di Filippo, A)

OSPSANTG 160X. Latin America in the International Economy
5 units, Win (Di Filippo, A)