

# ECONOMICS

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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, 25 to 30 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 comparative institutional analysis, econometrics, economic development, economic history, industrial organization, international trade, labor, macro- and microeconomic theory, mathematical economics, and public finance.

## UNDERGRADUATE PROGRAMS

### BACHELOR OF ARTS

The department established a new curriculum for the undergraduate program in September 1998 to strengthen students' quantitative skills and their knowledge of the analytical core of economics. The total number of units required for the major was increased from 60 to 75. Economet-

rics, ECON 102B is now required for all majors. Students are encouraged to take ECON 102A and 102B in their sophomore year. The required number of field courses has increased from two to four. There is now greater flexibility in the choice of electives, including upper-division math and statistics.

Of the 75 units required for the major, at least 50 must be taken at Stanford in California. Students cannot declare Economics as their major until they have completed ECON 1 with a grade of 'C+' or better.

### REQUIREMENTS FOR THE ECONOMICS MAJOR (75 UNITS)

1. ECON 1 (5 units): principles of economics.
2. 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.
3. ECON 50 (5 units): basic price theory. Prerequisite: ECON 1 and 50M or MATH 51, or passed diagnostic test (administered at the beginning of ECON 50) on multi-variable calculus.
4. ECON 51 and 52 (10 units): intermediate micro- and macroeconomics. Prerequisite: ECON 50.
5. ECON 102B (5 units): econometrics. Prerequisites: ECON 50 and 102A.

*Field Courses* (must be taken at Stanford in California; 20 units)—Four courses must be chosen from among ECON 111, 118, 121, 140,\* 141, 145, 149, 150, 154, 155, 156, 157, 160, 165 (5 units each).

*Writing in the Major Course* (5 units)—This requirement is fulfilled by ECON 101, or by another writing-intensive course approved by the Director of Undergraduate Study. 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 51, 52, 53, 103, 104, 113, 114, 115; or STATS 200.

\* 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.

Students with sufficiently high scores on the Advanced Placement Microeconomics and Macroeconomics tests can receive AP credit which enables them to fulfill the economics major without taking ECON 1. However, these students nevertheless must take 75 units of economics courses to obtain the major: the AP credit does not yield any units toward the major.

A grade point average (GPA) of '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*).

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 in the Economics Building, room 136. 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

*Note*—The curriculum for the minor in Economics was revised effective September 1, 1998 and the total number of units has increased from 30 to 35.

The minor in Economics has two main goals. The first is to acquaint students with the rudiments of micro- and macroeconomic theory that are required of all majors. The second is to allow students to build basic 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 1 (5 units): principles of economics.
2. ECON 50 (5 units): basic price theory. Prerequisites: ECON 1 and 50M or MATH 51, or passed diagnostic test (administered at the beginning of ECON 50) on multi-variable calculus.
3. ECON 51 and 52 (10 units): intermediate micro- and macroeconomics. Prerequisite: ECON 50.
4. Two field courses (must be taken at Stanford in California; 10 units) may be chosen from the following list: ECON 102B, 111, 118, 121, 140,\* 141, 145, 149, 150, 154, 155, 156, 157, 160, 165.
5. One elective (5 units) from Economics courses numbered 100 through 198, excluding 190 and 191.

\* Students may not count units from both ECON 135 and 140 towards their major 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.

No courses receiving Department of Economics credit under the preceding requirements may be taken credit/no credit. A grade point average (GPA) of 'C' 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 outstanding 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 75 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 75 units.)
4. Candidates must write an honors thesis in their senior year for 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 80 units overall.

Juniors interested in the honors program are urged to 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 the following 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. Economics courses must include 202; one course selected from 210, 211, 212, 162, or 140 to fulfill the macroeconomics requirement; and at least two other 200-level courses. Undergraduate courses must be numbered 105 or higher. No seminar courses numbered 300 or above can be counted.
2. Demonstrating competence in empirical methodology at the level of ECON 270. Normally, this is done by including that course in the program of study.
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 'B' must be maintained for all master's level work. In addition, a grade of 'B-' or better must be earned in each of the two graduate theory courses. 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 from the list below or one such field together with a substantial amount of work toward a field taught in a related department, if approved in advance by the Director of Graduate Study. Advanced fields include comparative institutional analysis, 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 will meet, and indeed exceed, the above standard 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*—Where courses are crosslisted between fields, students enrolling in both fields may not receive credit twice for taking the same course. In addition, the courses for distribution credit must include at least two that are not crosslisted in either of the two fields chosen to satisfy the field requirement.

1. *Additional Course Work*: four other graduate-level courses must be completed. One of these must be from the area of economic history, unless that field has already been selected above. In any event, these courses must be distributed in such a way that at least two fields not selected above are represented. In addition, if the special fields consist of econometrics together with microeconomic theory, the distribution courses must include at least two from outside these areas. With advance approval of the Director of Graduate Study, some of the distribution courses may be drawn from related fields taught in other departments. Including courses taken to meet additional field requirements, no more than two courses 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

The Department of Economics and the School of Law offer a joint program leading to the Ph.D. in Economics and the J.D. degree in Law. See the Stanford University bulletin *Law School* for descriptions of its participation in the joint program.

To qualify, the student’s program objectives must clearly justify such a joint program. Decisions are made by the Director of Graduate Study. A student’s program in economics must satisfy the same standards as a Ph.D. degree in Economics taken with a minor in Law. It is expected that dissertation research will cross department lines and that members of the dissertation committee will be drawn from both faculties.

Students normally spend the first year full time either in Economics or in Law and the second year full-time in the other department. After the second year, courses in economics and law may be pursued simultaneously.

Other joint programs may be arranged; for example, the Ph.D. in Economics combined with one or two years of study in the School of Law, leading either to the nonprofessional Master of Legal Studies (M.L.S.) degree or the nonprofessional Master of Jurisprudence (J.M.). See the bulletin *Law School* for the requirements. Conversely, a student taking the J.D. in the School of Law may apply for an M.A. in Economics.

#### FELLOWSHIPS AND ASSISTANTSHIPS

The department awards a number of fellowships for graduate study. Many first-year and a few select 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 1. Elementary Economics**—Introduction to the economic way of thinking and the functioning of a modern market economy. The behavior of consumers and firms. Markets for goods and inputs. Analysis of macroeconomic variables: output, employment, inflation, interest rate. Determination of long-run growth and short-term fluctuations. The role of government: regulation, monetary, and fiscal policy. Limited enrollment. GER:3b

5 units, Aut (Clerici-Arias), Win (G. Wright), Spr (Johnson)

**ECON 50M. Mathematical Preparation for Economics**—Mathematics preparation for 50 and 102A, for students who either did not pass the diagnostic test for Economics 50 (see above) or who have not taken MATH 51. Elements of multi-variable calculus, constrained optimization, and matrix algebra. Prerequisites: 1 and MATH 41.

5 units, Aut (Russell), Win (Meyer), Spr (Russell)

**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 from multi-variable calculus, using partial differentiation and techniques for constrained and unconstrained optimization. Prerequisites: 1, and 50M or MATH 51, or passed diagnostic test (administered at the beginning of ECON 50) on multivariable calculus. GER:2c

5 units, Aut (Tendall), Win (Johnson), Spr (Filipi)

**ECON 51. Economic Analysis II**—Introduction to 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, Win (Kubler), Spr (Tendall)

**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. Prerequisite: 50.

5 units, Win, Spr (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, Win (Stanton)

**ECON 91. Introduction to Cost Accounting**—(Graduate students register for 191.) The use of internal financial data for managerial decision making.

5 units, Spr (Davila)

**ECON 101. Economic Policy Analysis**—Develops skills in economic policy analysis, writing, and oral presentation. Topics vary with instructor. Limited enrollment. Prerequisites: 51 and 52, 102B, and at least two field courses. (WIM)

5 units, Aut (Gould, O'Brien-Strain, Rapoport)

5 units, Win (Alexis, Rothwell, Topper)

5 units, Spr (Gardner, Gould, Johnson, McCutcheon)

**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:2c

5 units, Aut (Pistaferrri), Win (Tendall)

**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 (Bresnahan), Spr (Vytlačil)

**ECON 102C. Advanced Topics in Econometrics**—Identification and estimation of the effect of human capital variables on earnings (e.g., 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 (Bajari)

**ECON 103. Applied Macroeconomic Analysis**—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, Spr (Hall)

**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 the public sector decision making as it relates to food policy.

5 units, Win (Falcon, Naylor)

**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), Win (Johnson)

**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 2002-03

**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:4a

5 units, Aut (Amemiya)

**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 world economy pre-WWI. Topics: the role of technics and sciences, variations of the extent of market activities, institutional changes, international politics, demography. GER:3b

5 units, Spr (Greif)

**ECON 116. American Economic History**—The history of the U.S. economy 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: 1. GER:3b,4b

5 units, Aut (Wright)

**ECON 118. Development Economics**—The economic problems and policy concerns of developing economies. Theories of economic growth and development, inequality and poverty, agriculture and rural development, fertility, education, the economic role of family. Focus is on economic models rather than case studies. Prerequisite: 51. GER:4a

5 units, Win (McKenzie)

**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.

5 units, Spr (*Gardner*)

**ECON 121. Development Economics, with Special Reference to East Asia**—The macroeconomic aspects of economic development: structural transformation, resource utilization, mobilization, and allocation; the sources of economic growth; intersectoral transfers; the role of the external sector; money and finance in development; stabilization in closed and open economies; strategies for economic development; the role of intangible capital; and endogenous technical progress. Illustrations from the economic development experience of E. Asia, including Japan, China, Hong Kong, S. Korea, Singapore, Taiwan, Indonesia, Malaysia, Philippines, Thailand. Prerequisite: 52. GER:4a

5 units, Spr (*Lau*)

**ECON 124. Contemporary Japanese Economy**—Analysis of the Japanese economy in comparative and historical perspective. Micro and institutional aspects, i.e., firms, the employment system, corporate governance and financial institutions, and the macro economy. Elementary applications of macro and micro economics. Prerequisite: 50. GER:4a

5 units, Spr (*Okazaki*)

**ECON 135. Finance I: Introduction to Finance for Non-MBAs**—(Same as FINANCE 221, MS&E 245G.) For graduate students and advanced undergraduates. The foundations of finance with applications in corporate finance and investment management. Major 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. The major corporate financial instruments including debt, equity, and convertible securities. Prerequisites: 51, or 102A, or equivalent; ability to use spreadsheets, knowledge of basic probability and statistics concepts including random variables, expected value, variance, and covariance.

4 units, Win (*Admati*)

**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). In the former, well-structured contracts give the party incentives to exercise control in a mutually beneficial way. In the latter, contracts should give the party incentives to reveal its private information truthfully. 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 2002-03

**ECON 138. Risk and Insurance**—Financial risk management that addresses how individuals and corporations can use financial instruments to hedge risk factors. Moral hazard, asymmetric information, and adverse selection. Why some insurance markets exist and others don't. The main risk factors that corporations face such as fluctuations in exchange rates, interest rates, and oil prices. How to set up hedging strategies based on trades in futures and options markets. Credit, weather, energy, and insurance derivatives. Prerequisite: 50.

5 units, Spr (*Timmerman*)

**ECON 139D. Directed Reading**

1-10 units, any quarter (*Staff*)

**ECON 140. Introduction to Financial Economics**—Introduction to 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: 50, and at least one course in regression analysis.

5 units, Aut (*Shoven*), Spr (*Kurz*)

**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, Spr (*Boskin*)

**ECON 142. The Political Economy of the Federal Budget**—(Enroll in PUBLPOL 196.)

5 units (*Staff*) not given 2002-03

**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, Win (*Hammond*)

**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, 102B. GER:4c

5 units, Win (*Pencavel*)

**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. Experimental data. Poverty and inequality. Optional research project for public policy organization on labor market/human resources issues. Prerequisite: 51.

5 units, not given 2002-03

**ECON 148. Urban Economics**—The economics of urban areas. Costs and benefits of cities, city location, land rent and land use, suburbanization, zoning, poverty, housing and segregation, homelessness, local government finance, transportation, schools, and crime. Prerequisites: 50, 102A.

5 units, Aut (*Alexis*)

**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, Aut (*Milgrom*)

**ECON 150. Economic Policy**—(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. Readings: the theoretical foundations of policy making and policy analysis, and applications to the adoption and implementation of programs in several areas. Prerequisite: 50. (WIM)

5 units, Win (*Cogan*)

**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 at least one of 102B, 103, 104, 113, 135, 137, 140, 149, 157, or 160.

5 units, Spr (Rosston)

**ECON 154. Economics of Legal Rules and Institutions**—Description and analysis of the existence, design, and consequences of legal rules. Topics: common ideas that run through diverse areas of law, including individual rationality, economic efficiency, conventional and Coasian analyses of externalities, enforcement, costs, and market consequences of legal restrictions on contract terms. Private vs. 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: property, intellectual property, contract, criminal, tort, family, and environmental law. Prerequisite: 51.

5 units, Aut (Polinsky)

**ECON 155. Environmental Economics & 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 the 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: 50.

5 units, Aut (Goulder)

**ECON 156. Economics of Health and Medical Care**—(Graduate students register for 256; same as BIOMEDIN 156/256, HRP 156/256.) Graduate students with research interests should take 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: 50 and 102A or equivalent statistics, or consent of instructor. Recommended: 51.

5 units, Aut (Bhattacharya)

**ECON 157. Imperfect Competition**—Extends and develops the basic tools of price theory in the context of U.S. industrial market structure. The application of theoretical models and concepts to the behavior of firms and markets when the conditions of perfect competition are not satisfied. Topics: monopoly, oligopoly, monopolistic competition, concentration measures, international competition, advertising, innovation, externalities, economies of scale, and the role of information in markets. Prerequisite: 51.

5 units, Aut (Athey)

**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, Win (Wolak)

**ECON 160. Game Theory and Economic Applications**—Mathematically rigorous 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 one rigorous course in calculus, or consent of instructor.

5 units, Win (Tadelis)

**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; hyperinflation and stabilizations; the effect of the national debt on consumption, savings, investment and output; time consistency of government policies. Prerequisites: 51, 52, 111.

5 units, Spr (Paal)

**ECON 165. International Economics**—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: 1, 51, 52.

5 units, Win (Willmann), Spr (Rossi-Hansberg)

**ECON 168. Path Dependence and Economic Analysis**—Historically contingent change in the economy; theoretical and applied research on path-dependent phenomena and their implications for economic policy. Topics: self organization in economics; relationships between micro level irreversibilities, branching processes, positive feedback dynamics and the generation of emergent properties at the macroeconomic level; non convexities, lock-in to suboptimal equilibria, and the economics of QWERTY. Historical antecedents and modern formalizations of historical economics, applications of paradigmatic models of non-ergodic stochastic processes. Case studies. Research papers required. Prerequisites: two upper-level economics courses in applied fields. Limited enrollment.

5 units, Win (David)

**ECON 169. International Financial Markets and Monetary Institutions**—(Graduate students register for 269.) How nations interact to ensure that international trade is monetized and multilateral rather than bartered and bilateral. Hedging exchange and interest rate risks: selection of currencies of invoice and trade credit; parity relationships among futures, swaps, and options contracts. The exchange rate and the trade balance. Regulating excess volatility in exchange rates and capital flows. Alternative international monetary standards from gold to the dollar to the European Monetary System. Prerequisite: 165. Recommended: knowledge of money and banking.

5 units, Spr (Zussman)

**ECON 170. Intermediate Econometrics I**—(Graduate students register for 270; see 270.)

5 units, Aut (Amemiya, Wolak)

**ECON 171. Intermediate Econometrics II**—(Graduate students register for 271, see 271.)

5 units, Aut (Wolak, MaCurdy)

**ECON 172. Intermediate Econometrics III**—(Graduate students register for 272; see 272.)

5 units, Win (MaCurdy, Vytlačil)

**ECON 179. Experimental Economics**—An introduction to experimental economics, its methods, and some of the 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)

**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, MATH 51 or equivalent.

5 units (Staff) not given 2002-03

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

**ECON 191. Introduction to Cost Accounting**—(Same as 91; see 91.)  
5 units, Spr (Davila)

**ECON 198. Junior Honors Seminar**  
5 units, Spr (Rothwell)

**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, Spr (Rothwell)

## PRIMARILY FOR GRADUATE STUDENTS

**ECON 239D. Directed Reading**  
1-10 units, any quarter (Staff)

**ECON 400. Ph.D. Dissertation**  
1-15 units (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 (Milgrom, Kubler)

**ECON 202N. 202 For Non-Economists**—Core Economics modules 1 and 2 for non-Economics Ph.D. students.

2-5 units, Aut (Filipi)

**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)

**ECON 203N. 203 for Non-Economists**  
2-5 units, Win (Coles)

**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, Kubler)

**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 (D. Krueger)

**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 (Kocherlakota)

**ECON 212. Core Economics: Modules 4 and 8**—Monetary theory: evidence on the nature of economic fluctuations, the role of money (overlapping generations, cash in advance, money in the utility function), the dynamic impact of changes in money on the economy, the natural rate of unemployment and job creation/destruction, exchange rate determination, international transmission of money, dynamic stochastic general equilibrium models. Macroeconomic policy: theoretical rationale or 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. Prerequisite: 203, 211.

2-5 units, Spr (Hall, Paal)

**ECON 301A,B,C. Microeconomic Workshop**  
1-10 units, Aut, Win, Spr (Staff)

**ECON 305A,B,C. Economic Applications Workshop**  
1-10 units, Aut, Win, Spr (Staff)

**ECON 310A,B,C. Macroeconomic Workshop**  
1-10 units, Aut, Win, Spr (Staff)

### B. ECONOMIC DEVELOPMENT

To receive comprehensive credit in the field, students must complete 214 and 217, and submit a paper from one of these two courses. Students wishing to do research in the field are strongly advised to take courses in international economics, such as 266, and in comparative institutional analysis.

**ECON 214. Development Economics: Microeconomic Issues**—Microeconomic problems of developing economies, emphasizing the rural agrarian. Topics: determination of income, models of savings, role of the household, and issues relating to health, nutrition, and education. Emphasis on empirical tests of theoretical models and empirical evidence on these issues.

2-5 units, Win (McKenzie)

**ECON 216. Development Economics and Growth: Macroeconomics**—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, Spr (Lau)

**ECON 217. Development Economics: Money and Finance**—Banking systems, interest rates, regulatory policies, and the productivity of capital in developing countries. Controlling inflation: fiscal and monetary policies for macroeconomic stability. Currency crises, exchange rates, and the liberalization of foreign trade. Further applications to transitional socialist economies in Asia and E. Europe.

2-5 units, Aut (McKinnon)

**ECON 267. Special Topics in International Economics**—Financial/currency crises. Intertemporal trade and growth. Exchange rate regimes, capital flows, and growth.

*2-5 units, not given 2002-03*

**ECON 315A,B,C. Development Workshop**

*1-10 units, Aut, Win, Spr (Staff)*

**C. ECONOMIC HISTORY/INSTITUTIONS**

The requirements for the field are: (1) a comprehensive exam in Spring Quarter based on material from at least two of the courses listed below, and (2) one research paper on a subject approved by one of the faculty teaching any of the following five courses.

**ECON 224. Science, Technology, and Economic Growth**—Upper-division undergraduates may attend 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, Aut (David)*

**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, Win (G. Wright)*

**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 2002-03*

**ECON 228. Institutions and Organizations in Historical Perspective**—(Same as 294.)

*2-5 units, Spr (Greif)*

**ECON 325A,B,C. Economic History Workshop**

*1-10 units, Aut, Win, Spr (Staff)*

**D. MONETARY THEORY AND ADVANCED MACROECONOMICS**

Requirements for the field are successful completion of 233 and 234.

**ECON 233. Monetary Theory and Advanced Macro I**—Topics in the theory of fluctuations and growth.

*2-5 units, Win (Hall, Paal)*

**ECON 234. Monetary Theory and Advanced Macroeconomics II**—Topics in the theory of fluctuations and growth.

*2-5 units, Spr (Kocherlakota)*

**ECON 235. Monetary Theory & Advanced Macro III**—Topics in the theory of fluctuations and growth.

*2-5 units, not given 2002-03*

**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.

**ECON 241. Public Economics and Political Economy I: Public Policy**—Basic 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 courses with the approval of instructor.

*2-5 units, Aut (Bernheim, Rangel)*

**ECON 242. Public Economics and Political Economy II: Public Institutions**—Social insurance systems; social security, unemployment, welfare, and public health systems. Introduction to political economy, with an emphasis on the effect of political institutions (such as electoral and legislative rules) on policies that are chosen. Federalism. Prerequisites: 202-204, 210, 270-271, or equivalent courses with the approval of instructor. 241 is not a prerequisite although it is highly recommended.

*2-5 units, Win (Boskin, Shoven)*

**ECON 243. Economics of Environment**—Open to upper-division undergraduates with consent of instructor. Analysis of the sources of environmental problems in market economies and of 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.

*2-5 units, Spr (Goulder)*

**ECON 244. Psychology And Economics**—Individual decision making: psychological and neurological foundations, evidence on heuristics and biases, and behavioral models. Social interactions: psychological foundations; models of social preferences, and fairness, cooperation, and conformity. Applications: savings behavior; formation of preferences; marketing, incentive theory, and compensation schemes; public good provision; and political economy. Prerequisites: 202, 203, 204, or consent of instructor.

*2-5 units, Spr (Bernheim, Rangel)*

**ECON 341A,B,C. Workshop on the Economics of the Public Sector**—Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and other policies; their effects on private economic activity, saving, investment, labor supply; 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, Win, Spr (Staff)*

**ECON 343B,C. Workshop in Environmental & Natural Resources Economics**—Economic analyses of environmental and natural resource problems and policies. Workshop consists of presentations by faculty and graduate students.

*1-10 units, B: Win, C: Spr (Goulder)*

**F. ECONOMICS OF LABOR**

To receive credit for the field, students must successfully 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, MaCurdy)*

**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.



2-5 units, Win (Pistaferra)

**ECON 248. Health, Medical Care, and Aging**—Introduction to current research and policy issues in the economics of health, medical care, and aging. Topics: technological change; demand for medical care; behavior of physicians, hospitals, and health plans; analysis of insurance markets; effects of health and health insurance on labor supply; health risks and individual behavior; economic demography; political economy of the health care sector. Emphasis is on the development and estimation of microeconomic models.

2-5 units, not given 2002-03

**ECON 345A,B,C. Applications Workshop**

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

**G. ECONOMICS OF INDUSTRY**

To receive credit for the field, students must successfully 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 256. Economics of Health and Medical Care**—(Same as 156; see 156.)

5 units, Aut (Bhattacharya)

**ECON 257,258. The Economics of Industry, Regulation, and Firm Organizations I and II**—Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; theory and practice of pro-competitive government policies; the relationship of product quality and technological innovation to market structure; government regulation of business; public utilities, regulated competition, licensing, product and worker safety, environmental protection; the political economy of business policies.

2-5 units, **257**: Aut (Athey, Einav), **258**: Win (Bresnahan)

**ECON 260. Special Topics in Industrial Organization and Regulation**—Issues of current research and policy interest: empirical tests of oligopoly theories; dynamics of change in regulatory policy; theory of economic 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.

2-5 units, Spr (Athey, Einav)

**ECON 355A,B,C. Industrial Organization Workshop**—Working seminar on current research in the field by visitors, presentations by students, and structured discussion of recent papers. Students are required to write an original research paper, make a formal seminar presentation, and lead a structured discussion.

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

**H. INTERNATIONAL ECONOMICS**

To receive comprehensive credit in this field, students must complete 266 and either 265 or 269, and submit a paper from one of these three courses. All three courses are strongly recommended. For students doing research in the field, further supporting courses are found in the fields of economic development, industrial organization, and public finance.

**ECON 265. Open Economy Macroeconomics**—The theoretical foundations of international macroeconomics and empirical evidence. Topics: the intertemporal approach to the current account, international asset trade, exchange rate economics, balance of payments crises, international capital flows and sovereign risk, and the welfare economics of exchange rate regimes.

2-5 units, Spr (M. Wright)

**ECON 266. International Trade**—The determinants of trade and comparative advantage. Trade with imperfectly competitive markets. Income distribution and the gains from trade. Commercial policies: tariffs and quotas. Political economy of trade.

2-5 units, Win (Rossi-Hansberg)

**ECON 267. Special Topics in International Economics**—See section 'B' above.

2-5 units, not given 2002-03

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

5 units, Spr (Zussman)

**ECON 365A,B,C. International Trade Workshop**

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

**I. ECONOMETRICS**

All Economics Ph.D. students are required to take a comprehensive examination based on 270, 271, and 272.

To receive credit in the econometrics field, students must complete 273A and 273B.

**ECON 270. Intermediate Econometrics I**—(Same as 170.) Probability, random variables, and distributions; large sample theory; theory of estimation and hypothesis testing. Limited enrollment. Prerequisites: math and knowledge of probability at the level of Chapter 2, Paul G. Hoel, *Introduction to Mathematical Statistics*, 5th ed.

5 units, Aut (Amemiya, Wolak)

**ECON 271. Intermediate Econometrics II**—(Same as 171.) Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Limited enrollment. Prerequisite: 270.

5 units, Aut (Wolak, MaCurdy)

**ECON 272. Intermediate Econometrics III**—(Same as 172.) Continuation of 271. Nonlinear estimation, qualitative response models, limited dependent variable (Tobit) models. Limited enrollment. Prerequisite: 271.

2-5 units, Win (MaCurdy, Vytlačil)

**ECON 273A. Advanced Econometrics I**—Parametric asymptotic theory. Large-sample properties of estimators defined as the solution to an optimization problem, under a variety of assumptions for the true data generation process. General large sample results for maximum likelihood, nonlinear least squares, nonlinear instrumental variables estimators, including the generalized method of moments estimator under general conditions. Asymptotic hypothesis testing procedures derived for each estimation framework.

2-5 units, Aut (Wolak)

**ECON 273B. Advanced Econometrics II**—Simulations methods. Semiparametric and nonparametric methods. Optimal rate of convergence and semiparametric efficiency bounds. Prerequisite: 273A.

2-5 units, Win (Vytlačil)

**ECON 274. Limited Dependent Variables**—Discrete choice models; Tobit models; Markov chain and duration models. Prerequisite: 273 or consent of instructor.

2-5 units, Win (Amemiya)

**ECON 275. Time Series and Simultaneous Equation**—Stochastic processes in the time and frequency domain. Time and frequency domain estimation. Unit roots, co-integration, time-varying conditional second moment models, instrumental variables estimation of dynamic models.

2-5 units, Spr (McKenzie)

**ECON 276. Advanced Econometrics**—Possible topics: robust estimation, stochastic control, prediction theory, Bayesian analysis, factor analysis, pooling of time series and cross section data. Prerequisite: 273A,B.

2-5 units, not given 2002-03

**ECON 370A,B,C. Econometrics Workshop**

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

## J. MICROECONOMIC THEORY

This field consists of two sub-fields: J1, General Theory, and J2, Decisions, Contracts, and Incentives. To receive credit in General Theory, students must complete two courses from 280, 281, 284, 286, and 287. To receive credit in Decisions, Contracts, and Incentives, students must complete two courses from 281, 282, 283, 286, and 289.

**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)*

**ECON 280. Welfare Economics**—Social choice theory with and without interpersonal comparisons; Pareto efficiency with public goods, externalities, and non-convexities; potential Pareto improvements. Private information, incentive constraints, and mechanism design. Welfare measurement, cost benefit analysis, and analysis of economic policy reform.

*2-5 units, Aut (Hammond)*

**ECON 281. Economics of Uncertainty**—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 2002-03*

**ECON 282. Theory of Information and Organization**—(Same as 291.) Incompleteness of insurance and financial markets. Restricted participation. Existence, indeterminacy, and constrained inefficiency of competitive equilibrium. Sunspots. Asymmetric information: moral hazard, adverse selection, and signaling in market environments. Common knowledge and the absence of trade. Prerequisites: 202, 203, 204, or consent of instructor.

*2-5 units, Win (Tadelis)*

**ECON 283. Advanced Topics in Contracts and Organization**—(Same as 293.) Recent developments and promising research in contracts and organizations. Topics: reputational concerns, implicit contracts in long-term relationships, contractual solutions to the hold-up problem, property rights and the theory of the firm, multilateral contracting. Prerequisite: 282/291 or consent of instructors.

*2-5 units, not given 2002-03*

**ECON 284. Topics in Dynamic Financial Economics**—Dynamic General Equilibrium Asset Pricing theories, the Equivalent Martingale Measure, characteristics of market volatility and the role of market expectations. Bayesian models of learning and expectation formation, exposition of basic tools of Ergodic Theory. The theory of Rational Beliefs and Endogenous Uncertainty. Applications to the study of the dynamics of asset pricing, volume of trade, term structure of interest rates and the forward premium, the equity premium, forward bias in foreign exchange markets. Prerequisites: 202, 203, 204 or equivalent, basic probability theory or consent of instructor.

*2-5 units, Win (Kurz)*

**ECON 285. Market Design**—(Same as 295.) 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.

*2-5 units, Spr (Milgrom)*

**ECON 286. Game Theory and Economic Application**—Solution concepts for non-cooperative games, repeated games, games of incomplete information, reputation, and experiments. Covers both standard results and current research topics.

*2-5 units, Aut (Levin)*

**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: 202, 203, 204, or consent of instructor.

*2-5 units, not given 2002-03*

**ECON 288. Computational Economics**—Computational approaches to solving economic problems. Overview of numerical analysis. Economic problems in computationally tractable forms, and the use of numerical analysis techniques to solve them. Examples of problems solved numerically (general equilibrium models, optimal taxation, dynamic programming, economic growth, life-cycle models, intervention in commodity markets, Bayesian econometrics, equilibria of dynamic and repeated games, and nonlinear rational expectations equilibria with asymmetric information). Prerequisite: equivalent of first-year graduate core economics sequence.

*2-5 units, Aut (Judd)*

**ECON 289. Advanced Topics in Game Theory and Information Economics**—Topics include repeated games with informational asymmetries, including applications to collusion as well as government policy games and dynamic insurance problems; advanced topics in auction theory and mechanism design; intrapersonal games, such as self-control problems and dynamic inconsistency; information acquisition in decision problems, games, and mechanisms.

*2-5 units, Win (Athey)*

**ECON 290. Multiperson Decision Theory**—(Same as MGTECON 608.) Review of working papers, emphasizing methods of game theory and topics in mathematical economics that use game-theoretic models. The effects of differences in information, limitations on observability and contracts, etc., on strategic behavior. Prerequisites: two courses from the microeconomic theory sequence, or consent of instructor. May not be used to satisfy the seminar participation requirement for the Ph.D. program.

*2-5 units, not given 2002-03*

**ECON 385A,B,C. Mathematical Economics Workshop**

*1-10 units, Aut, Win, Spr (Staff)*

**ECON 387. Microeconomics Workshop**—(Same as MGTECON 629.) Forum for presentation of current work and general discussion of research in microeconomic theory. Focus is on game-theoretic analyses but any methodology is welcome, as are topics from related fields such as macroeconomics, experimental/behavioral economics, electronic commerce, computer science, law, political science, and psychology. Meetings are scheduled to match the supply of work-in-progress ready for presentation, averaging three times per month from October to May. An enrolled participant (in September, for 2 units) must present and submit a paper during the year; unenrolled participants are welcome.

*4 units, Aut (Staff)*

## K. COMPARATIVE INSTITUTIONAL ANALYSIS

To receive credit for this field, students are required to take 282/291, and then select at least one of 292, 293, 294, or 295. Students expecting to make Comparative Institutional Analysis their primary research field are also required to take the workshop (391).

**ECON 291. Theory of Information and Organization**—(Same as 282; see 282.)

*2-5 units, Win (Tadelis)*

**ECON 292. Comparative Analysis of Organizations and Institutions**—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 complementarities and diachronic institutional linkage.

*2-5 units, not given 2002-03*

**ECON 293. Advanced Topics in Contracts and Organization**—(Same as 283. See 283.)

*2-5 units, not given 2002-03*

**ECON 294. Institutions and Organizations in Historical Perspective**—(Same as 228.)

*2-5 units, Spr (Greif)*

**ECON 295. Market Design**—(Same as 285; see 285.)

*2-5 units, Spr (Milgrom)*

**ECON 391A,B,C. Seminar in Comparative Institutional Analysis**—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 complementarities and diachronic institutional linkage.

*1-10 units, Aut, Win, Spr (Staff)*

## 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

**ECON 115X. The German Economy: Past and Present**—(Same as POLISCI 111P.)

*4-5 units, Aut (Klein)*

**ECON 161X. The German Economy in the Age of Globalization**

*4-5 units, Win (Klein)*

### BUENOS AIRES

**ECON 162X. Themes in the Political Economy of Argentina**—(Same as INTNLREL 162X.)

*5 units, Spr (Staff)*

### MOSCOW

**ECON 120X. Economic Reform and Economic Policy in Modern Russia**

*5 units, Aut (Mau)*

### OXFORD

**ECON 166X. The Modern British Economy**

*5 units, Win (Robinson)*

### PARIS

**ECON 124X. Building the European Economy: Economic Policies and Challenges Ahead**

*5 units, Aut (Germanangue)*

### PUEBLA

**ECON 118X. Development Macroeconomics: The Mexican Case**—(Same as LATINAM 114X.)

*5 units, Win (Cárdenas)*

**ECON 159X. Competitiveness and Corporate Governance of Latin American Firms**—(Same as LATINAM 109X.)

*5 units, Win (Castañeda-Ramos)*

### SANTIAGO

**ECON 119X. The Chilean Economy: History, International Relations, and Development Strategies**

*5 units, Spr (Di Filippo)*

**ECON 160X. Latin America in the International Economy**—(Same as LATINAM 119X.)

*5 units, Win (Di Filippo)*

**ECON 165X. Latin American Economies in Transition**—(Same as LATINAM 130X.)

*5 units, Aut (Muñoz)*

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