

ECONOMICS

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Economics is much broader than the study of recessions and inflation or stocks and bonds. Economists study decision making and incentives and how taxes create incentives for labor market and savings behavior. Many current public policy debates concern questions of economics, including: causes and consequences of inequality and gender and racial wage gaps; how to address poverty; the impact of immigration and trade on the well-being of a country's citizens; the cause of the Great Recession; and how to predict future downturns.

Those with economics training find employment in government agencies, non-profits, and, of course, economic consulting and investment banking. In addition to pursuing advanced degrees in economics, economics majors go on to do graduate work in law and business.

INTRODUCTORY COURSES

Introductory courses in microeconomics; macroeconomics; and data analysis and econometrics serve students considering a major in Economics, as well as others who seek an introduction to the subject. ECON 115 is concerned with microeconomics and includes such topics as markets, prices, production, distribution, and the allocation of resources. ECON 116 covers such macroeconomic issues as unemployment, inflation, growth, and international economics. ECON 117 introduces students to basic aspects of working with data to answer economic questions, as well as to the fundamentals of statistical analysis. ECON 116 and 117 have microeconomics as a prerequisite. Despite the numbering, students may wish to take ECON 117 before or concurrently with ECON 116, as the data skills taught in ECON 117 may be helpful in ECON 116. ECON 115, 116, and 117 are lecture courses with accompanying discussion sections.

First-year students and sophomores looking for smaller, slightly more discussion-oriented versions of introductory microeconomics and macroeconomics may enter a lottery for admission to ECON 110 and 111. Those with little or no experience in calculus may be better served by ECON 108, which covers microeconomics with greater discussion of quantitative methods and examples. ECON 108, 110, and 115 are similar in substance; ECON 111 and 116 are similar in substance as well. A student may receive credit for only one course each in introductory microeconomics and introductory macroeconomics.

The department recommends that students interested in majoring in Economics take at least two introductory economics courses in the first year. In order to make the introductory courses available to all first-year students and to students majoring in other subjects, the introductory courses do not have a mathematics requirement.

PLACEMENT AND EXEMPTIONS FOR INTRODUCTORY COURSES

In the summer before they enter, all first-year students receive, through the University's electronic bulletin board, a personalized recommendation for a first course in economics, based on application data and AP (and equivalent) exam scores.

The department recommends that students with little or no calculus enroll in ECON 108. Those with a stronger background should enroll in ECON 110 (if successful in the lottery) or ECON 115. In general, students who receive a score of 5 on the Microeconomics or Macroeconomics AP exam *and* a score of 5 on the AP Calculus BC exam are allowed to place out of the corresponding introductory course and instead enroll in intermediate-level courses (ECON 121 or 125 for microeconomics, ECON 122 or 126 for macroeconomics). Students who have the requisite AP Economics score but not the corresponding AP Calculus score may take calculus (e.g., MATH 115, 118, or 120), and then place out of the corresponding introductory economics course. Students may substitute a score of 7 on the International Baccalaureate higher-level Economics examination or A on the GCE A-level Economics examination for AP test scores of 5 in economics. In addition, a score of 7 on the International Baccalaureate higher-level Mathematics examination or A on the GCE A-level Mathematics examination may be substituted for a qualifying AP Calculus score.

Because of its emphasis on data manipulation, the department recommends that even students with a background in statistics should begin their econometrics and data analysis training with ECON 117.

REQUIREMENTS OF THE MAJOR

Students majoring in Economics are required to take twelve term courses. Three of these are the introductory courses, one in microeconomics, one in macroeconomics, and one in data analysis and econometrics. All majors must take the following courses: one term of intermediate microeconomics (ECON 121 or 125) and one term of intermediate macroeconomics (ECON 122 or 126); and one Yale mathematics course, usually selected from MATH 112, 115, 118, or 120. The department recommends that students also take ECON 123, a course in econometrics and data analysis at the intermediate level. All of the aforementioned required courses should be completed prior to the senior year. Majors must also take two courses numbered ECON 400–491, at least one of which must be taken in the senior year.

Subject to approval by the director of undergraduate studies, students may count toward the major one course related to economics but taught in another field, in addition to the required course in mathematics.

Mathematics Students are advised to meet the mathematics requirement for the major during their first year. To fulfill the requirement, the department recommends that majors take MATH 118 or 120. Students who place out of these mathematics courses must take

a higher-level mathematics course at Yale and should consult the DUS for help choosing a course. Students who intend to pursue a graduate degree in economics should take additional math courses, including linear algebra (MATH 222 or 225) and real analysis (MATH 300 or 301).

Data analysis and econometrics Students are strongly advised to take a two-term sequence of data analysis and econometrics courses, especially if they are considering writing a senior essay or are interested in research experience on or off campus. The statistical analysis of economic data has become central to the work of economists, and the ability to analyze large data sets is a skill that will serve students in the job market both inside and outside of academia. Most students should take ECON 117, followed by 123. ECON 132 and 420 are more advanced courses in data analysis and applied econometrics. Students with a stronger mathematics background, who prefer a more theoretical treatment of the material or who plan to pursue a graduate degree in economics, are encouraged to take either ECON 135 or S&DS 241 and S&DS 242, followed by ECON 136. (Note: S&DS 241 and 242 together count as one course towards the economics major.) Prospective majors are urged to start their econometrics sequence in the fall of sophomore year.

Intermediate microeconomics and macroeconomics Two course options are available in both microeconomics and macroeconomics. The standard intermediate courses are ECON 121 and 122. Students with a stronger mathematics background are encouraged to take ECON 125 and 126 instead. The intermediate courses need not be taken in sequence: in particular, ECON 125 is not required for 126.

Field courses The department offers a wide selection of upper-level courses that explore in greater detail material presented in introductory courses. Advanced fields of economics include theoretical, quantitative, and mathematical economics; market organization; human resources; finance; international and development economics; public policy and the public sector; health; labor; poverty; environmental economics; and economic history. Some field courses have only introductory microeconomics as a prerequisite. Others apply intermediate-level theory or econometrics to economic problems and institutions, and for this reason list one or more of the theory or econometrics courses as prerequisites.

Advanced lecture courses Advanced lecture courses, generally numbered ECON 400–449, are limited-enrollment courses that cover relatively advanced material in more depth than regular field courses. Prerequisites usually include two of intermediate microeconomics, intermediate macroeconomics, and econometrics or a mathematics course such as MATH 120. Advanced lecture courses may be applied toward the senior requirement. While these courses vary in approach, they share features of other Economics courses: like field courses, they devote some time to traditional lecturing, and like seminars, they emphasize class interaction, the writing of papers, and the reading of journal articles.

Seminars Although there is diversity in approaches in the various seminars (courses generally numbered ECON 450–489), all have in common an emphasis on class interaction, the writing of papers, and the reading of journal articles. Seminars represent an opportunity for students to apply and extend the economics they have learned through their earlier coursework. Seminars may be applied toward the senior requirement.

Enrollment in seminars and advanced lecture courses is limited. Senior Economics majors who have not yet completed the senior requirement for the major are given priority for these courses and may preregister; see the departmental website for instructions. Students must take two of three core courses in intermediate microeconomics, intermediate macroeconomics, and econometrics before enrolling in a seminar. Other majors and nonmajors may also enroll in Economics seminars and advanced lecture courses as space permits, but they may not preregister.

Distinction in the Major To be considered for Distinction, students must meet the appropriate grade standards as described in this bulletin under Honors and submit a senior essay to the Economics department. Students who fail to submit an essay will not be considered for Distinction. Grade computation for Distinction does not include the introductory economics courses, the required mathematics course, or courses taken outside Yale.

Credit/D/Fail Courses taken Credit/D/Fail and residential college seminars may not be counted toward the requirements of the major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

Majors are required to take two departmental courses numbered ECON 400–491, at least one of which must be taken in the senior year. The senior requirement must be met by taking Yale Economics courses.

Senior essay Only those majors who submit a senior essay earning a grade of A or A- are eligible for Distinction in the Major. There are four types of senior essays: (1) students may write a one-term essay in the fall of the senior year as an independent project on a topic of their own design under the close and regular supervision of a faculty adviser (ECON 491); (2) students may write a two-term essay starting in the fall and continued into the spring of the senior year as an independent project on a topic of their own design under the close and regular supervision of a faculty adviser (ECON 491 and ECON 492); (3) students may write a one-term essay in an advanced departmental course (numbered 400–489) taken during the fall term of the senior year; or (4) students may write a two-term essay beginning in an advanced departmental course (numbered 400–489) taken during the fall term, and completed in the spring of the senior year as an independent project under the close and regular supervision of a faculty adviser (ECON 492). Under this final option the instructor of the advanced departmental course taken in the fall term typically serves as the faculty adviser.

Note that the essay must be written during the senior year and that students may submit a senior essay only if they have an approved prospectus and a senior essay adviser. Senior essays that are not submitted on time will receive a grade of Incomplete. Senior essays with grades of Incomplete without permission of the residential college dean are subject to grade penalties when submitted.

Students are advised to complete a second semester of econometrics either before or concurrently with writing the senior essay; at least one of the two econometrics courses should be ECON 117, 123, 132 or 420. Beginning with the class of 2021, students will not be allowed to write a senior essay without completing two semesters of econometrics.

Meetings for seniors to discuss the senior essay guidelines and requirements will be held on Tuesday, August 28, 2018 at 12:15 p.m. and Wednesday, August 29, 2018 at 4:00 p.m. in Room 106, 28 Hillhouse Avenue. Senior essay prospectus forms are due Monday, October 1, 2018.

ADVISING

The Economics department has faculty representatives/advisers for each residential college, typically fellows of that college. Students majoring in economics should consult with and secure written approval of their course selection from one of their college representatives. Questions concerning the major or programs of study should also be directed to the college representative. College representatives can be found on the department website.

Transfer Credits Students who take a term abroad or take summer courses outside of Yale may petition the DUS to count at most two courses from outside Yale toward the requirements of the major. Students who take a year abroad may petition to count at most three courses. Many economics courses taken outside Yale do not meet the requirements of the Economics major; students should consult with the DUS before taking such courses. Courses taken outside Yale may not be counted toward the major requirements in introductory microeconomics, introductory macroeconomics, intermediate microeconomics, intermediate macroeconomics, or econometrics. See the departmental website section on transferring credits.

Graduate courses Well-qualified students who have acquired the requisite background in undergraduate courses may, with written permission of the instructor, the DUS, and the director of graduate studies, be admitted to graduate courses and seminars. Descriptions of courses are available on the department website.

Students who are planning graduate work in economics should take additional mathematics courses beyond the one-term course required for the major. Many graduate programs in economics require courses in multivariate calculus, linear algebra, and real analysis. Please see the department website on PhD program preparation. Students are urged to discuss their plans for graduate work with the DUS as early in their college careers as possible.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific courses required ECON 121 or 125; ECON 122 or 126; 123, 132, or 136

Distribution of courses 3 introductory classes (or equivalents with DUS permission); 2 core courses (intermediate micro and intermediate macro); 1 math course; 4 electives (additional econometrics or courses numbered 159 and above)

Substitution permitted 1 related course in another dept, with DUS approval

Senior requirement 2 courses numbered ECON 400–491, at least 1 in senior year

FACULTY OF THE DEPARTMENT OF ECONOMICS

Professors Joseph Altonji, Donald Andrews, Costas Arkolakis, Dirk Bergemann, Steven Berry, Truman Bewley, Xiaohong Chen, Ray Fair, John Geanakoplos, Pinelopi Goldberg, Timothy Guinnane, Philip Haile, Marina Halac, Johannes Horner, Gerald Jaynes, Yuichi Kitamura, Alvin Klevorick, Samuel Kortum, Naomi Lamoreaux, Giovanni Maggi, Konstantinos Meghir, Giuseppe Moscarini, William Nordhaus, Gerard Padro-Miquel, Peter Phillips, Benjamin Polak, Mark Rosenzweig, Larry Samuelson, Anna Sanktjohanser, Robert Shiller, Anthony Smith, Aleh Tsyvinski, Edward Vytlačil, Ebonya Washington, Fabrizio Zilibotti

Associate Professors Timothy Armstrong, Mitsuru Igami

Assistant Professors Jose-Antonio Espin-Sanchez, Mira Frick, Zhen Huo, John Eric Humphries, Ryota Iijima, Ilse Lindenlaub, Yusuke Narita, Michael Peters, Nicholas Ryan, Joseph Shapiro, Cormac O'Dea

Senior Lecturers Marnix Amand, Michael Boozer, Evangelia Chalioti, William Hawkins, Tolga Koker, Guillermo Noguera, Maria Saez Marti

Lecturer Katerina Simons

Introductory Courses

* **ECON 108a or b, Quantitative Foundations of Microeconomics** Tolga Koker

Introductory microeconomics with a special emphasis on quantitative methods and examples. Intended for students with limited or no experience with calculus. Enrollment limited. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 110 or 115. QR, SO

*** ECON 110a or b, An Introduction to Microeconomic Analysis** Staff

Similar to ECON 115, but taught as a lecture discussion with limited enrollment. Enrollment limited to first-years and sophomores. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 108 or 115. QR, SO

*** ECON 111a or b, An Introduction to Macroeconomic Analysis** Staff

Similar to ECON 116, but taught as a lecture discussion with limited enrollment. Enrollment limited to first-years and sophomores. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 116. Prerequisite: ECON 108, 110, or 115. SO

ECON 115a or b, Introductory Microeconomics Staff

An introduction to the basic tools of microeconomics to provide a rigorous framework for understanding how individuals, firms, markets, and governments allocate scarce resources. The design and evaluation of public policy. May not be taken after ECON 108 or 110. QR, SO

ECON 116a or b, Introductory Macroeconomics Staff

An introduction that stresses how the macroeconomy works, including the determination of output, unemployment, inflation, interest rates, and exchange rates. Economic theory is applied to current events. May not be taken after ECON 111. Prerequisite: ECON 108, 110, or 115. SO

ECON 117a or b, Introduction to Data Analysis and Econometrics Staff

Introduction to data analysis from the beginning of the econometrics sequence; exposure to modern empirical economics; and development of credible economic analysis. This course emphasizes working directly and early with data, through such economic examples as studies of environmental/natural resource economics, intergenerational mobility, discrimination, and finance. Topics include: probability, statistics, and sampling; selection, causation and causal inference; regression and model specification; and machine learning and big data. Prerequisites: ECON 108, 110, 115, or equivalent and familiarity with single variable calculus. Students who have taken ECON 131 may not receive major credit for this course. QR, SO

Intermediate Courses

ECON 121a or b, Intermediate Microeconomics Staff

The theory of resource allocation and its applications. Topics include the theory of choice, consumer and firm behavior, production, price determination in different market structures, welfare, and market failure. After introductory microeconomics and completion of the mathematics requirement for the major or its equivalent. Elementary techniques from multivariate calculus are introduced and applied, but prior knowledge is not assumed. May not be taken after ECON 125. QR, SO

ECON 122a or b, Intermediate Macroeconomics Staff

Contemporary theories of employment, finance, money, business fluctuations, and economic growth. Their implications for monetary and fiscal policy. Emphasis on empirical studies, financial and monetary crises, and recent policies and problems. Enrollment limited in the fall term. After two terms of introductory economics and completion of the mathematics requirement for the major or its equivalent. May not be taken after ECON 126. QR, SO

ECON 125a, Microeconomic Theory Jack Fanning

Similar to ECON 121 but with a more intensive treatment of consumer and producer theory, and covering additional topics including choice under uncertainty, game theory, contracting under hidden actions or hidden information, externalities and public goods, and general equilibrium theory. Recommended for students considering graduate study in economics. After introductory economics, and MATH 118 or 120 or equivalent. May not be taken after ECON 121. QR, SO

*** ECON 126b, Macroeconomic Theory** Giuseppe Moscarini

Similar to ECON 122 but with a more intensive treatment of the mathematical foundations of macroeconomic modeling, and with rigorous study of additional topics. Recommended for students considering graduate study in economics. After two terms of introductory economics, and MATH 118 or 120 or equivalent. May not be taken after ECON 122. QR, SO

Data Analysis and Econometrics

ECON 123b, Intermediate Data Analysis and Econometrics Edward Vytlačil

Comprehensive and theoretical examination of econometrics, with further exploration of topics covered in ECON 117. A term research project addresses a research question chosen by the student, and involves the application of learned methods to a relevant data set. Prerequisites: ECON 108, 110, 115, or equivalent; ECON 117; and familiarity with single variable calculus. QR, SO

ECON 132a or b, Applied Data Analysis and Econometrics Staff

Core topics include regressions, statistical inference, choice of functional form, heteroskedasticity, two-stage least squares, quasi-experimental methods like regression discontinuity design, and qualitative choice models. Additional topics may include time series models, serial correlation, forecasting, and machine learning methods. Many applications to development, education, health, labor, public finance, and political economy problems. Emphasis on statistical computing and the mechanics of how to conduct and present empirical research. Prerequisites: Two terms of introductory economics, completion of the mathematics requirement for the major, and ECON 123, 131 or 136 or a course in the STAT 101–106 series. QR, SO

ECON 135a, Introduction to Probability and Statistics Donald Andrews

Foundations of mathematical statistics: probability theory, distribution theory, parameter estimation, hypothesis testing, regression, and computer programming. Recommended for students considering graduate study in economics. Prerequisites: Introductory microeconomics and MATH 118 or MATH 120 and MATH 222; or MATH 120 and MATH 225. QR, SO

ECON 136b, Econometrics Yuichi Kitamura

Continuation of ECON 135 with a focus on econometric theory and practice: problems that arise from the specification, estimation, and interpretation of models of economic behavior. Topics include classical regression and simultaneous equations models; panel data; and limited dependent variables. Recommended for students considering graduate study in economics. Prerequisites: After ECON 135 or STAT 241 and 242. May not be taken concurrently with STAT 242. QR, SO

Field Courses

ECON 159a or b, Game Theory Staff

An introduction to game theory and strategic thinking. Ideas such as dominance, backward induction, Nash equilibrium, evolutionary stability, commitment, credibility, asymmetric information, adverse selection, and signaling are applied to games played in class and to examples drawn from economics, politics, the movies, and elsewhere. After introductory microeconomics. No prior knowledge of game theory assumed. QR, SO

ECON 170a, Health Economics and Public Policy Howard Forman

Application of economic principles to the study of the U.S. health care system. Emphasis on basic principles about the structure of the U.S. system, current problems, proposed solutions, and the context of health policy making and politics. After introductory microeconomics. SO

ECON 171b / AFAM 469b / EDST 271b, Urban Inequalities and Educational Inequality Gerald Jaynes

Analysis of contemporary policy problems related to academic under performance in lower income urban schools and the concomitant achievement gaps among various racial and ethnic groups in United States K-12 education. Historical review of opportunity inequalities and policy solutions proposed to ameliorate differences in achievement and job readiness. Students benefit from practical experience and interdisciplinary methods, including a lab component with time spent in a New Haven high school. Prerequisites: Any course offered by Education Studies, or one course in history or any social science, either: Anthropology, Economics, Political Science, Psychology, Sociology. EDST 110 is preferred, although not required. SO

ECON 182b / HIST 135b, American Economic History Joshua Lewis

The growth of the American economy since 1790, both as a unique historical record and as an illustration of factors in the process of economic development. The American experience viewed in the context of its European background and patterns of industrialization overseas. After introductory microeconomics. WR, SO

ECON 184b / GLBL 234b, International Economics Peter Schott

Introduction to conceptual tools useful for understanding the strategic choices made by countries, firms, and unions in a globalized world. After two terms of introductory economics. SO

ECON 187a, European Economic History, 1815–1945 Timothy Guinnane

European economic growth and development from the industrialization of Germany and other Continental countries in the early nineteenth century through World War II. The role of institutional development, the role of trade and imperialism, agricultural improvements, and industrialization. After two terms of introductory economics. SO

ECON 210b / EDST 201b, Economics of Education Joseph Altonji

Application of basic economic concepts and empirical methods to the analysis of education. Topics include the economic return to secondary and postsecondary education, the quality of elementary and secondary education, the market for teachers, inequality in education attainment, and school choice. Prerequisites: ECON 108, 110, or 115. A prior course in statistics or econometrics is helpful but not required. SO

ECON 251b, Financial Theory Eduardo Davila

Study of the financial system as part of the global economy, rather than only the financial world. Topics include bond pricing, the capital asset pricing model, option pricing, the social security system, the mortgage market, hedge funds, collateral, default, and financial crises. Prerequisite: After introductory microeconomics. QR, SO

ECON 252b, Financial Markets Robert Shiller

An overview of the ideas, methods, and institutions that permit human society to manage risks and foster enterprise. Description of practices today and analysis of prospects for the future. Introduction to risk management and behavioral finance principles to understand the functioning of securities, insurance, and banking industries. After two terms of introductory economics. SO

ECON 255a, Introduction to Corporate Finance Michael Pascutti

Introduction to the concepts and techniques necessary to analyze and implement optimal investment decisions. Prerequisite: introductory microeconomics and introductory macroeconomics. SO

ECON 275b / PLSC 218b, Public Economics Staff

The role of government in the economy and in our economic lives. Reasons for government intervention in the market economy and the impact of government expenditure programs and taxation systems on welfare and behavior. Tools of microeconomics applied to issues

such as government response to global warming, the impact of redistribution and social insurance on individual behavior, school choice, social security vs. private retirement savings accounts, and government vs. private health insurance. After introductory microeconomics. SO

ECON 325a or b / SAST 281a or b, Economics of Developing Countries: Focus on South Asia Zachary Barnett-Howell

Analysis of current problems of developing countries. Emphasis on the role of economic theory in informing public policies to achieve improvements in poverty and inequality, and on empirical analysis to understand markets and responses to poverty. Topics include microfinance, education, health, agriculture, intrahousehold allocations, gender, and corruption. Prerequisites: introductory microeconomics and introductory econometrics. SO

ECON 330b / EVST 340b, Economics of Natural Resources Robert Mendelsohn

Microeconomic theory brought to bear on current issues in natural resource policy. Topics include regulation of pollution, hazardous waste management, depletion of the world's forests and fisheries, wilderness and wildlife preservation, and energy planning. After introductory microeconomics. QR, SO

ECON 338a / EAST 338a / GBL 318a, The Next China Stephen Roach

Economic development in China since the late 1970s. Emphasis on factors pushing China toward a transition from its modern export- and investment-led development model to a pro-consumption model. The possibility of a resulting identity crisis, underscored by China's need to embrace political reform and by the West's long-standing misperceptions of China. Prerequisite: introductory macroeconomics. SO

ECON 339b, Advance Competition Economics and Policy Fiona Scott Morton

Limits that antitrust laws, as applied and interpreted by agencies, courts, and competitors, place on firm behavior. Economic theories underlying antitrust enforcement. Whether legal rules restricting competitive behavior increase social welfare and how they affect managerial choices. The evidence and reasoning advanced in key antitrust cases; how outcomes may affect social welfare and firm strategies. Goals and procedures of US and EU antitrust agencies. SO

ECON 350a, Mathematical Economics: General Equilibrium Theory Truman Bewley

An introduction to general equilibrium theory and its extension to equilibria involving uncertainty and time. Discussion of the economic role of insurance and of intertemporal models, namely, the overlapping generations model and the optimal growth theory model. Recommended for students considering graduate study in economics. After MATH 118 or 120, and intermediate microeconomics. QR, SO

ECON 351b, Mathematical Economics: Game Theory Johannes Horner

Introduction to game theory and choice under uncertainty. Analysis of the role of information and uncertainty for individual choice behavior, as well as application to the decision theory under uncertainty. Analysis of strategic interaction among economic agents, leading to the theory of auctions and mechanism design. Recommended for students considering graduate study in economics. After MATH 118, 120, and intermediate microeconomics. QR, SO

* **ECON 360b, Capital Markets** Gary Gorton

Topics related to capital markets, with emphasis on the financial crisis of 2007–2008. The design, pricing, and trading of corporate bonds, credit derivatives, and money market instruments; bond restructuring, bond ratings, and financial crises; basic tools used to address such issues, including fixed income mathematics, binomial option pricing, and swaps. Prerequisites: intermediate microeconomics and econometrics.

Note: Econ 360a "Capital Markets" is cross-listed with SOM MGT 947a and has space for up to five undergraduates.

ECON 361a or b, Corporate Finance Staff

Financial management from inside the corporation or operating entity. Topics include capital budgeting and valuation, optimal capital structure, initial public offerings, mergers, and corporate restructuring. Cases and problem sets provide applications. Prerequisites: intermediate microeconomics and econometrics.

* **ECON 363a, Global Financial Crisis** Andrew Metrick and Timothy Geithner

Comprehensive survey of the causes, events, policy responses, and aftermath of the recent global financial crisis. Study of the dynamics of financial crises in a modern economy. Prerequisite: Successful completion of a course in introductory economics. SO

ECON 375a / GBL 219a, Monetary Policy William English

Introduction to modern macroeconomic models and how to use the models to examine some of the key issues that have faced monetary policymakers during and after the global financial crisis of 2008–2009. Prerequisites: Intermediate level macroeconomics (ECON 122 or 126) and introductory econometrics. WR, SO

Advanced Lecture Courses

Senior Economics majors may preregister for advanced lecture courses; see the departmental website for instructions. Other interested students may enroll with permission of the instructor during the course selection period.

* **ECON 403b / GBL 332b, Trade and Development** Guillermo Noguera

For some developing countries, international trade has brought about rapid growth and large-scale reductions in poverty. Meanwhile for other developing countries, international trade has simply increased inequality and brought little growth. This course draws on

both theoretical models and empirical evidence to better understand the reasons for these very different experiences. Topics include: standard models of trade, trade and poverty in developing countries, the impact of trade on inequality and growth, the role of firms and multinationals in developing countries, trade policy, foreign direct investment, trade and technology transfer, the Chinese and Indian experience.

Prerequisites: Intermediate microeconomics and one econometrics/statistics course. SO

*** ECON 407a / GBL 310a, International Finance** Ana Fieler

A study of how consumers and firms are affected by the globalization of the world economy. Topics include trade costs, the current account, exchange rate pass-through, international macroeconomic co-movement, multinational production, and gains from globalization. Prerequisite: intermediate macroeconomics or equivalent. SO

ECON 409a, Firms, Markets, and Competition Philip Haile

Analysis of imperfectly competitive markets, focusing on the interactions among firm behavior, market structure, and market outcomes. Topics include oligopoly, collusion, predation, firm entry, advertising, and price discrimination as well as public policy implications of market behavior. After intermediate microeconomics or equivalent. QR, SO

*** ECON 410b, The Economics of Innovation** Mitsuru Igami

Study of forces that drive the process of innovation. Creativity and creative destruction; the innovator's dilemma; incentives to innovate; competitive advantage; industry evolution; intellectual property. Use of both formal theoretical models and quantitative empirical studies, as well as descriptive studies from management strategy and economic history. Prerequisites: econometrics and intermediate microeconomics.

*** ECON 412b, International Environmental Economics** Joseph Shapiro

Introduction to international and environmental economics and to research that combines the two fields. Methods for designing and analyzing environmental policy when economic activity and pollution cross political borders. Effects of market openness on the environment and on environmental regulation; international economics and climate change. Prerequisites: intermediate microeconomics and econometrics. SO

*** ECON 413a / AMTH 437a / EENG 437a / S&DS 430a, Optimization Techniques** Sekhar Tatikonda

Fundamental theory and algorithms of optimization, emphasizing convex optimization. The geometry of convex sets, basic convex analysis, the principle of optimality, duality. Numerical algorithms: steepest descent, Newton's method, interior point methods, dynamic programming, unimodal search. Applications from engineering and the sciences. Prerequisites: MATH 120 and 222, or equivalents. May not be taken after AMTH 237. QR

ECON 414a, Economic Models of New Technology Evangelia Chalioti

Analysis of firms' incentives to innovate, focusing on the effects of market power on the intensity of innovative activity. Topics include strategic investment in innovation, patent races, the diffusion of knowledge, intellectual property (IP) protection systems, IP licensing, research joint ventures, litigation, venture capital, and conflicts between IP rights and antitrust regulation. Prerequisites: intermediate microeconomics and econometrics. SO

ECON 415a, Political Economy Giovanni Andreottola

This class provides an introduction to the theory of political decision-making. Both classic results and more recently developed models are presented. After completing the course, students are prepared to write a senior essay on topics related to political economy. Prerequisites: ECON 115 or equivalent; ECON 121. Elements of basic calculus (derivatives, optimization problems) and prior knowledge of basic game theory is suggested. SO

ECON 416a, Labor Economics: Employment, Wages, and Skills Ilse Lindenlaub

Topics in labor economics from theoretical and empirical points of view. Models of supply and demand in a competitive market economy; changes in the allocation of workers to jobs, wage distribution, and wage inequality; reasons why the labor market may not be perfectly competitive; and what determines unemployment and the reallocation of workers after job loss. Prerequisites: intermediate microeconomics and econometrics. SO

ECON 417b, Computational Methods in Economics Anthony Smith

Introduction to the basic tools of numerical analysis and how to apply them to the study of economic models in a variety of subdisciplines, including macroeconomics, labor economics, industrial organization, public finance, and environmental economics. Prerequisite: intermediate microeconomics, intermediate macroeconomics, and econometrics. SO

ECON 419a, Financial Time Series Econometrics Xiaohong Chen

Survey of methods used to analyze financial time series data. Classic linear models; autocorrelation in error variances; methods that allow for nonlinearities; methods tailored to analysis of high-frequency data and modeling of value at risk; vector autoregressive models; factor models; the Kalman filter. Prerequisites: ECON 117 and 123, ECON 131 and 132, or ECON 135 and 136. SO

*** ECON 422b, Neuroeconomics for Economists** Ifat Levy

Study of neuroscience, neuroimaging, and the tools and training needed by economics students to join neuroscientists and psychologists in the emerging field of neuroeconomics. Critical reading of neuroeconomics papers, translating experimental economics models into neuroeconomics paradigms, and use of neuroscientific data in economics research. Prerequisite: intermediate microeconomics and econometrics. SO

ECON 424b / GBLB 308b, Central Banking William English

Introduction to the different roles and responsibilities of modern central banks, including the operation of payments systems, monetary policy, supervision and regulation, and financial stability. Discussion of different ways to structure central banks to best manage their responsibilities. Prerequisites: Intermediate Microeconomics, Intermediate Macroeconomics, and Introductory Econometrics. SO

ECON 433a, The Economics of Space Konstantinos Arkolakis

Analysis of the ways that space affects economic behavior. The course develops the required quantitative techniques to analyze detailed spatial information on economic activity and pairs them with simple models that determine how economic activity is allocated across space. See <https://www.theeconomicsofspace.com/>. Prerequisites: MATH 118, 120, or permission of instructor. SO

Seminars

Senior Economics majors may preregister for departmental seminars; see the departmental website for instructions. Other interested students may enroll with permission of the instructor during the course selection period.

* **ECON 408b / GBLB 238b, International Trade Policy** Giovanni Maggi

Analysis of issues concerning international trade policy and agreements, including recent academic research. Welfare analysis of trade policy; the political economy of trade policy; international trade agreements. Attention to both theoretical methods and empirical research. Prerequisites: intermediate microeconomics and ECON 184. SO

ECON 426b, Economic Development of China and Japan since the 1800s John Tang

This seminar compares the economic development of Japan and China from the early 19th century through the early 21st. Using history and economic history textbooks for both countries and a neoclassical growth framework, the course examines the contours of each country's development through the perspectives of industrialization, imperialism, institutions, and international engagement. Topics are covered biweekly in a comparative context for both countries. Prerequisite: Intermediate Macroeconomics. SO

* **ECON 444a, Market Inefficiencies and the Limits of Arbitrage** Michael Pascutti

The role of hedge funds in the United States financial markets and hedge fund behavior; understanding what hedge funds do, why they exist, and how they are different from other investment vehicles. Study of investment strategies that provide opportunity and risk for investors and study of academic papers analyzing (risky) arbitrage strategies. Prerequisite: intermediate microeconomics and econometrics. SO

* **ECON 445b, The U.S. Banking System** Michael Pascutti

The special functions of banks in the U.S. economy. The benefits but fragile nature of the banking system. Prerequisites: intermediate macroeconomics, microeconomics, and econometrics. SO

* **ECON 449b / EP&E 244b / PLSC 374b, The Economic Analysis of Conflict** Gerard Padro

Introduction to the microeconomic analysis of internal conflict. In particular, how conflict imposes economic costs on the population and how people react to conflict. Topics include the correlates of war; the economic legacies of conflict on human capital, local institutions, households' income, and firm performance; and the causes and impacts of forced displacement. Prerequisites: Intermediate microeconomics and econometrics. SO

* **ECON 450a, Investment Analysis** Dean Takahashi and David Swensen

Examination of investment management in theory and practice. Discussion of asset allocation, investment strategy, and manager selection from the perspective of an institutional investor. Focus on the degree of market efficiency and opportunity for generating attractive returns. SO

* **ECON 454a / EP&E 254a / GBLB 331a, Evolution of Central Banking** Rakesh Mohan

Changes in the contours of policy making by central banks since the turn of the twentieth century. Theoretical and policy perspectives as well as empirical debates in central banking. The recurrence of financial crises in market economies. Monetary policies that led to economic stability in the period prior to the collapse of 2007–2008. Changes in Monetary Policies since the Great Financial Crisis. Prerequisite: ECON 122. SO

* **ECON 456b, Private Equity Investing** Michael Schmeitzler

A case-oriented study of principal issues and investment types found in substantial private equity portfolios. Discussion of enterprise valuation, value creation, business economics, negotiation, and legal structure, based on primary source materials and original cases. Prerequisite: Econometrics, or ECON 255, or permission of instructor. SO

* **ECON 458b, The Economics of Population** Timothy Guinnane

An overview of some basic demographic methods such as the life table and age-standardized rates, followed by consideration of the core topics in economic demography: fertility, mortality, and migration, along with their connections to the economy and economic development. The course is largely based on reading and discussion of journal articles. Prerequisites: Introductory Econometrics and Intermediate Microeconomics. SO

* **ECON 461b, Economics, Addiction, and Public Policy** Jody Sindelar

Smoking, alcoholism, illicit drugs, and obesity studied from economic and policy perspectives. Focus on causes of and solutions to problems. After introductory microeconomics. SO

* **ECON 463b / BENG 403, The Economics and Science of Medicine** Gregory Raskin and Yashodhara Dash

The class is an exploration of the scientific background of today's bestselling medicines, their huge commercial impact, and the companies that created them. It focuses on the most compelling aspects of drug development and company formation in the context of topical issues like cancer treatment, DNA sequencing, stem cell therapy, and drug pricing controversies. Prerequisite: Introductory microeconomics or Introductory Biology, Molecular Biology, Chemistry, or Biomedical Engineering. SO

* **ECON 465a / EP&E 224a / GLBL 330a, Debating Globalization** Ernesto Zedillo

Facets of contemporary economic globalization, including trade, investment, and migration. Challenges and threats of globalization: inclusion and inequality, emerging global players, global governance, climate change, and nuclear weapons proliferation. Prerequisite: background in international economics and data analysis. Preference to seniors majoring in Economics or EP&E. SO RP

* **ECON 466a, International Monetary System** Dmitry Mukhin

This course is about the after-Bretton-Woods architecture of the international monetary system. We discuss the special status of the U.S. in the global economy and its interactions with the Eurozone and emerging economies. Prerequisite: ECON 122 or ECON 126. SO

* **ECON 467b / GLBL 307b, Economic Evolution of the Latin American and Caribbean Countries** Ernesto Zedillo

Economic evolution and prospects of the Latin American and Caribbean (LAC) countries. Topics include the period from independence to the 1930s; import substitution and industrialization to the early 1980s; the debt crisis and the "lost decade"; reform and disappointment in the late 1980s and the 1990s; exploration of selected episodes in particular countries; and speculations about the future. Prerequisites: intermediate microeconomics and macroeconomics. SO

* **ECON 470b / EP&E 232b / GLBL 233b, Strategies for Economic Development** Rakesh Mohan

How strategies for economic development have changed over time and how dominant strands in development theory and practice have evolved. Students trace the influence of the evolution in thinking on actual changes that have taken place in successful development strategies, as practiced in fast growing developing countries, and as illustrated in case studies of fast growth periods in Japan, South Korea, Brazil, China, and India. Prerequisites: introductory microeconomics and macroeconomics.

* **ECON 471b / EP&E 297b, Topics in Cooperative Game Theory** Pradeep Dubey

The theory and applications of cooperative games. Topics include matching, bargaining, cost allocation, market games, voting games, and games on networks. Prerequisite: intermediate microeconomics.

* **ECON 472a, Economics of Artificial Intelligence and Innovation** Evangelia Chalioti

This course studies the economics of innovation and the effects of artificial intelligence on different industries. Topics include economics of the intellectual property (IP) protection system; strategic choices in innovation and competition; patent races; measurement and big data; the sharing and digitalized economy; collective intelligence and decisions; online auctions; venture capital; legal and social infrastructure. Prerequisites: ECON 115 or equivalent; ECON 121. SO

* **ECON 473b / EP&E 227b / PLSC 343b, Equality** John Roemer

Egalitarian theories of justice and their critics. Readings in philosophy are paired with analytic methods from economics. Topics include Rawlsian justice, utilitarianism, the veil of ignorance, Dworkin's resource egalitarianism, Roemer's equality of opportunity, Marxian exploitation, and Nozickian procedural justice. Some discussion of American economic inequality, Nordic social democracy, and the politics of inequality. Recommended preparation: intermediate microeconomics. SO

* **ECON 474b / EAST 454b / GLBL 312b, Economic and Policy Lessons from Japan** Stephen Roach

An evaluation of modern Japan's protracted economic problems and of their potential implications for other economies, including the United States, Europe, and China. Policy blunders, structural growth impediments, bubbles, the global economic crisis of 2008, and Abenomics; risks of secular stagnation and related dangers to the global economy from subpar post-crisis recoveries. Focus on policy remedies to avert similar problems in other countries. Prerequisite: an introductory course in macroeconomics. SO

* **ECON 475a / EP&E 286a, Discrimination in Law, Theory, and Practice** Gerald Jaynes

How law and economic theory define and conceptualize economic discrimination; whether economic models adequately describe behaviors of discriminators as documented in court cases and government hearings; the extent to which economic theory and econometric techniques aid our understanding of actual marketplace discrimination. Prerequisites: introductory microeconomics and at least one additional course in Economics, African American Studies, Ethnicity, Race, and Migration, or Women's, Gender, and Sexuality Studies.

* **ECON 476a, The Theory and Application of Corporate Credit Investing** John Rapaport

Exploration of the theory and practical application of investing in corporate debt, particularly U.S. credit markets from the perspective of a market participant. Course work based on economic theory, with focus on original cases and primary materials. Prerequisites: ECON 122 and 136 or permission of instructor. SO

* **ECON 480b / GLBL 311b, Banking Crises and Financial Stability** Sigridur Benediktsdottir

Focus on systemic risk, banking crises, financial stability and macroprudential policies. Additional emphasis on systemic risk and prudential policies in peripheral European economies and emerging economies. Prerequisites: ECON 115 and 116, or equivalent. SO

* **ECON 483b / SAST 476b, The Economics of India** Staff

The history and contemporary status of India's economy, including policy debates and growth potential. The Indian economy during the colonial era, the period of Nehruvian socialism, and the subsequent crisis and reforms; modern industry, services, agriculture, and finance; the development of human capital in India through health and education programs. Case studies from current economic research. Prerequisites: intermediate microeconomics and econometrics. SO

* **ECON 485a / PSYC 485, Behavioral Economics** Idione Meneghel

Study of foundational topics in behavioral economics. Focus on theories of single-agent behavior that aim to incorporate non-standard phenomena into classic economic models, with consideration of intertemporal decision-making, choice under uncertainty, and learning. Prerequisites: ECON 121; some familiarity with game theory and probability theory. SO

* **ECON 487a, Economics of Rules and Governments** Nicolas Werquin

This senior seminar explores the optimal design of government policies, centered around taxation, redistribution, and social insurance policies. It emphasizes the interplay between economic theory and empirical analysis to make informed policy recommendations. The main topics revolve around questions of taxation and redistribution. There has been an explosion of income and wealth inequality in recent decades, and automation and globalization will continue to disrupt our economies in the future. To address these challenges, governments have access to a powerful policy tool: taxation of individual or firms. They can use taxes to redistribute income through social insurance policies, stimulate the economy in recessions, or provide incentives to slow global warming. We discuss in depth all of these objectives and analyze the most efficient way to design policies. The discussion is based on several academic papers, one of which will be compulsory reading in preparation for each lecture. Prerequisites: ECON 115 or equivalent, ECON 121. Intermediate macroeconomics (ECON 122 or 126) and introductory econometrics (ECON 131 or 135) are recommended but not required. SO

Senior Essay and Directed Reading Courses

* **ECON 491a and ECON 492b, The Senior Essay** Ebonya Washington

Students deciding to write one-term senior essays by enrolling in ECON 491, or two-term senior essays by enrolling in ECON 491 and 492, must choose their topics and advisers by Monday, October 1, 2018. One-term senior essays are due at the end of the last week of classes in the fall term. Two-term senior essays are due by 4:30 p.m. on Wednesday, April 3, 2019. Essays should be submitted electronically to the Economics department (qazi.azam@yale.edu). Failure to turn the essay in on time will result in grade penalties and the loss of consideration for distinction. Advisers are chosen with the assistance of the DUS. The format and character of the departmental senior essay may vary to suit the interest of the student and the demands of the topic, but it is expected that the tools and concepts of economic analysis will be employed and that the essay will contain original research. Paper lengths may vary; the normal expectation is thirty pages. Students may receive up to two credits for the senior essay, though it counts as only one departmental seminar whether one or two terms are taken. Meetings for seniors to discuss the senior essay guidelines and requirements will be held on Tuesday August 28, 2018 at 12:15 p.m. and Wednesday, August 29, 2018 at 4:00 p.m. in Room 106, 28 Hillhouse Avenue. Senior essay prospectus forms are due Monday, October 1, 2018.

* **ECON 498a and ECON 499b, Directed Reading** Ebonya Washington

Junior and senior economics majors desiring a directed reading course in special topics in economics not covered in other graduate or undergraduate courses may elect this course, not more than once, with written permission of the director of undergraduate studies and of the instructor. The instructor meets with the student regularly, typically for an hour a week, and the student writes a paper or a series of short essays. Junior and senior majors may take this course for a letter grade, but it does not meet the requirement for a department seminar.