

# ECONOMICS

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undergraduate-program

Economics is much broader than the study of recessions and inflation or stocks and bonds. Economists study decision making and incentives such as 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.

At Yale, economics is regarded and taught as part of a liberal arts education, not as a preparation for any particular vocation. It can, however, provide a good background for several professions. The economics major strengthens critical reasoning skills and gives students experience manipulating and analyzing data, skills that will serve students well on the job market both inside and outside academia. Recent majors have pursued careers in business, government, and nonprofits. Others have entered law, medical, or business school, or have gone on to graduate work in economics, often after working in related fields for two or three years.

## REQUIREMENTS OF THE MAJOR

There are no prerequisites for the major. Twelve credits are necessary to complete the major (11 Economics courses and 1 Mathematics course). The required distribution of courses is as follows:

**Math requirement** This can be fulfilled by MATH 110/111, 112, 115, 116, ENAS 151, or preferably MATH 118 or 120. MATH 118 and 120 are recommended because they emphasize economics applications. Any Math course numbered 200 or higher can also be used to fulfill the math requirement. Note that MATH 110 and 111 together count as one course toward the economics major.

**Introductory microeconomics** ECON 108 or ECON 110 or ECON 115. You can skip or Cr/D/F introductory microeconomics courses based on pre-college testing or other circumstances, but in this case, an extra elective course is required.

**Introductory macroeconomics** ECON 111 or ECON 116. You can skip or Cr/D/F introductory macroeconomics courses based on pre-college testing or other circumstances, but in this case, an extra elective course is required.

**Intermediate microeconomics** ECON 121 or ECON 125

**Intermediate macroeconomics** ECON 122 or ECON 126

**Econometrics** ECON 117 or ECON 123 or ECON 136 (Students are required to complete a second semester of econometrics either before or during the first semester of senior year.)

**Four electives** Any ECON course numbered 123 or above can count as an elective, if not already applied towards the core requirements. With DUS approval, a non-ECON course that is related to economics can be used to fulfill one of the electives.

**Senior requirement** Two courses numbered ECON 400–491 (at least one taken in senior year) are required.

**Senior essay** Writing a senior essay is optional (see more details below), but it is necessary to earn distinction in the major.

**Distinction in the major** To earn Distinction, a student must write a senior thesis earning a grade of A- or better and receive A- or better in three-quarters of the courses that are counted toward the major (not including introductory microeconomics, introductory macroeconomics, the math requirement or courses taken outside of Yale). Economics courses taken beyond the requirements of the major are counted toward the Distinction calculation.

**Credit/D/Fail** Courses taken Cr/D/Fail may not be counted toward the requirements of the major.

**Note** Residential College Seminars and First Year Seminars (ECON 001/002) may not be counted toward the requirements of the major.

## INTRODUCTORY COURSES

Many Yale students, regardless of what major they later choose, take introductory courses in economics. The department offers introductory courses in microeconomics, macroeconomics, and data analysis and econometrics. Microeconomics examines how individuals, firms, markets, and governments allocate scarce resources; macroeconomics studies growth, unemployment, inflation, and international economics; data analysis and econometrics teaches students statistical fundamentals and how to manipulate data to answer economic questions. Students must take introductory microeconomics before taking either introductory macroeconomics or data analysis and econometrics. Some students may wish to take introductory data analysis and econometrics before or concurrently with introductory macroeconomics, as data skills may be useful in the latter class.

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.

ECON 110 and 111 are smaller, slightly more discussion-oriented versions of introductory microeconomics and macroeconomics. 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.

The department recommends that students interested in majoring in Economics take at least two introductory economics courses in the first year. 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.

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 (or equivalent) exam scores. 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 recommended 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).

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

### MATHEMATICS COURSES

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 MATH 120, or a higher-level course. Also acceptable, but less preferred, are MATH 112, 115, 116, ENAS 151, or MATH 110 and 111. Students who intend to pursue a graduate degree in economics should take additional math courses, including linear algebra (MATH 222 or even better, a proof-based course such as MATH 225 or 226) and real analysis (MATH 255 or 256 or 300 or 301).

### DATA ANALYSIS AND ECONOMETRICS COURSES

Students are strongly advised to take a two-term sequence of data analysis and econometrics courses, especially if they are interested in a 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. 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 ECON 135 or S&DS 241 and S&DS 242, followed by ECON 136. Prospective majors are urged to start their econometrics sequence by the fall of sophomore year.

**Note** S&DS 241 and 242 together count as one course toward the economics major. Further note that neither ECON 135 nor S&DS 241 and 242 fulfill the major's requirement of one econometrics course as they are courses in probability and statistics that are prerequisites for ECON 136, a course in econometrics. However, either ECON 117 or ECON 123 fulfills the econometrics requirement.

### INTERMEDIATE MICROECONOMICS AND MACROECONOMICS COURSES

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 who are interested in a more theoretical treatment of the material 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; ECON 121 is not required for 122.

### FIELD COURSES

The department offers a wide selection of upper-level courses in a variety of fields, such as theoretical and mathematical economics, market organization, human resources, finance, international trade, development economics, public finance, health economics, labor economics, inequality, environmental economics, and economic history. These courses are numbered ECON 159 and above. Some field courses have no prerequisites or 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.

### SENIOR REQUIREMENT

Two courses numbered ECON 400–491 (at least one taken in senior year) are required.

Advanced lecture courses, generally numbered ECON 400–449, are limited-enrollment courses that cover relatively advanced material in more depth than regular field courses. 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. Advanced lecture courses may be applied toward the senior requirement.

Senior seminars are generally numbered ECON 450–490. Although there is diversity in approaches in the various seminars, 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.

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 enter preference selection before the registration period for these courses; see the department website for instructions. Other majors and non-majors may enroll in Economics seminars and advanced lecture courses as space permits, but they may not enter preference selection.

### SENIOR ESSAY

Students have the option to write a Senior Essay; it is not required. 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 400–490) 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 400–490) 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 for the full academic year.

Students are required to complete a second semester of econometrics either before or during the first semester of senior year.

### ADVISING

The Economics department has faculty representatives/advisers for each residential college. Students majoring in economics should consult with an economics adviser for their college during course enrollment. Questions concerning the major or programs of study may also be directed to the college representative. College representatives can be found on the department website.

### Transfer credits

Students who take courses outside of Yale may petition the DUS to count some of them toward the requirements of the major. Students should consult with the DUS before taking such courses. Courses taken outside of Yale's Economics department may not be counted toward the major requirements in intermediate microeconomics, intermediate macroeconomics, econometrics, mathematics, or the senior requirement. See the department website section on transferring credits.

### Graduate courses

Well-qualified students who have acquired the requisite background in undergraduate courses may 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 Ph.D. program preparation. Students are urged to discuss their plans for graduate work with the DUS as early in their college careers as possible.

## SUMMARY OF MAJOR REQUIREMENTS

**Prerequisites** None

**Number of courses** 12 term courses (including math req and senior req)

**Distribution of courses** Introductory micro and macro; intermediate micro (ECON 121 or 125); intermediate macro (ECON 122 or 126); econometrics (ECON 117 or 123 or 136); one math course (MATH 112 or above, see Math requirement options); four electives (see above)

**Substitutions permitted** 1 non-ECON course related to economics, with DUS approval, can replace an elective course. If you place out of an introductory course you must take an additional elective.

**Senior requirement** 2 courses numbered ECON 400–491 (at least one of which taken in senior year)