Economics

The School of Social Sciences

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Degrees Offered: B.A., M.A., Ph.D.

Undergraduates may major in either economics or mathematical economic analysis. The latter is recommended for students who intend to continue on to graduate work in economics or pursue a business or governmental job in which analytical and quantitative skills are required.

The eight major fields available for graduate study are econometrics, economic development, economic theory, industrial organization and regulation, international trade and finance, labor, macroeconomics and/or monetary theory, and public finance.

Degree Requirements for B.A. in Economics or Mathematical Economic Analysis

For general university requirements, see Graduation Requirements (pages 17–19). Students in either major should have at least 120 total semester hours at graduation. Full information regarding major requirements is available from the department office.

Economics Major. Students majoring in economics must take at least 10 courses: 9 in economics and 1 in quantitative methods (see below). Students may graduate with honors by achieving a B+ (3.33 grade point average) in all economics courses and by writing a senior thesis while taking ECON 403 and 404 Senior Independent Research (see Honors Programs on page 34), or HONS 470 Rice Undergraduate Scholars Program—Proposal Development and HONS 471 Rice Undergraduate Scholars Program—Research (see HONS courses page 383).

Students may transfer no more than 3 of the 9 required economics courses from other schools, and students transferring the equivalent of ECON 211 or 212 Principles of Economics I or II must pass a department qualifying exam (additional transfer credits in economics may count toward university graduation requirements but not departmental
major requirements). In general, the required course in quantitative analysis may also be transferred; however, ACCO 305 *Introduction to Accounting* cannot be transferred from another institution. The three-course limit on transfer credits does not apply to students transferring from other universities.

The department strongly recommends that students take two semesters of calculus (MATH 101 and 102 *Single Variable Calculus I* and *II* or MATH 111 *Fundamental Theorem of Calculus* and MATH 112 *Calculus and Its Applications*) and a course in probability and statistics (ECON 382 *Elements of Statistical Methods*, also offered as STAT 310 *Probability and Statistics*). Failure to take these courses will limit the range of electives available to the student.

Course requirements for the economics major include the following:

### All of the following:

- ECON 211 and 212 *Principles of Economics I* and *II*
- ECON 370 *Microeconomic Theory*
  (or ECON 372 *Mathematical Microeconomics*)
- ECON 375 *Macroeconomic Theory*

### At least 3 courses in applied economics from the following:

- ECON 301 *History of Economic Analysis*
- ECON 355 *Money and Banking*
- ECON 415 *Human Resources, Wages, and Welfare*
- ECON 416 *Economic History of the U.S.: 1700–1945*
- ECON 417 *Comparative History of Industrialization*
- ECON 420 *International Economics*
- ECON 421 *International Finance*
- ECON 430 *Comparative Economic Systems*
- ECON 435 *Industrial Organization*
- ECON 436 *Government Regulation of Business*
- ECON 437 *Economics of Information, Common Property Resources, and Public Goods*
- ECON 438 and 439 *Economics of the Law I* and *II*
- ECON 440 *Economics of Uncertainty*
- ECON 445 *Managerial Economics*
- ECON 448 *Corporation Finance*
- ECON 450 *World Economic and Social Development*
- ECON 451 *Political Economy of Latin America*

### 1 quantitative methods course from the following (or approved equivalent):

- ECON 452 *Principles of Islamic Economics and Finance*
- ECON 455 *Money and Financial Markets*
- ECON 461 *Urban Economics*
- ECON 472 *Introduction to Game Theory*
- ECON 480 *Environmental and Energy Economics*
- ECON 482 *Distributive Justice—A Microeconomic Approach*
- ECON 483 *Public Finance*
- ECON 485–486 *Contemporary Economics Issues*

**Mathematical Economic Analysis Major.** Students majoring in mathematical economic analysis must take at least 16 courses (see below). Students may graduate with honors by achieving a B+ (3.33 grade point average) in the 16 courses required for the major and any other economics electives taken. Course requirements for the mathematical economic analysis major include the following:
All of the following:
ECON 211 and 212 Principles of Economics I and II
ECON 372 Mathematical Microeconomics
ECON 375 Macroeconomic Theory
ECON 382 Elements of Statistical Methods (STAT 310 Probability and Statistics)
(or STAT 410 Introduction to Statistical Computing and Regression)
(or STAT 431 Mathematical Statistics I)
ECON 400 Econometrics
MATH 101 and 102 Single Variable Calculus I and II
MATH 211 Ordinary Differential Equations and Linear Algebra
MATH 212 Multivariable Calculus
(or MATH 221 Honors Calculus III)
MATH 355 Linear Algebra
(or CAAM 310 Linear Algebra)

At least 3 courses in applied economics from the following:
ECON 301 History of Economic Analysis
ECON 355 Money and Banking
ECON 415 Human Resources, Wages, and Welfare
ECON 416 Economic History of the U.S.: 1700–1945
ECON 417 Comparative History of Industrialization
ECON 420 International Economics
ECON 421 International Finance
ECON 430 Comparative Economic Systems
ECON 435 Industrial Organization
ECON 436 Government Regulation of Business
ECON 437 Economics of Information, Common Property Resources, and Public Goods
ECON 438 and 439 Economics of the Law I and II
ECON 440 Economics of Uncertainty
ECON 445 Managerial Economics
ECON 448 Corporation Finance
ECON 450 World Economic and Social Development
ECON 451 Political Economy of Latin America
ECON 452 Principles of Islamic Economics and Finance
ECON 455 Money and Financial Markets
ECON 461 Urban Economics
ECON 480 Environmental and Energy Economics
ECON 483 Public Finance
ECON 485 and 486 Contemporary Economics Issues

At least 1 course in advanced analysis from the following (or an approved equivalent):
ECON 440 Economics of Uncertainty
ECON 471 Linear Programming
ECON 472 Introduction to Game Theory
ECON 475 Integer and Combinatorial Optimization
ECON 476 Operations Research—Stochastic Models
ECON 477 Mathematical Structure of Economic Theory
ECON 478 Economic Applications of Mathematical Programming
ECON 482 Distributive Justice—A Microeconomic Approach
CAAM 451 Numerical Linear Algebra
CAAM 460 Optimization Theory
CAAM 472 Game Theory and Decision Analysis

At least 1 approved research course from the following:
ECON 403–404 Senior Independent Research
ECON 495–496 Senior Seminar

Graduate Courses in the Mathematical Economic Analysis (MTEC) Major.
Undergraduate majors satisfying the course prerequisites may, subject to the approval of the instructor and of the chair of the departmental undergraduate committee, substitute certain graduate courses for undergraduate courses as follows: ECON 501 for ECON 372; ECON 502 for ECON 375; ECON 504 for ECON 382; ECON 510 for ECON 400. Furthermore, ECON 505 and ECON 508 may also be taken by undergraduates and may be used toward satisfying MTEC course requirements. Specifically, ECON 505 could be
used either in the category headed “At least 3 courses in applied economics from the following . . .” or “At least 1 course in advance analysis from the following,” while ECON 508 could be used only in the category “At least 1 course in advanced analysis from the following.”

Note that this set of graduate courses (ECON 501, 502, 504, 505, 508, and 510) includes 6 of the 7 courses required during the first year of the Ph.D. program at Rice. Rice graduates who subsequently enroll in the Ph.D. program at Rice will be given graduate credit for all 500-level economics courses taken while undergraduates. With judicious planning and hard work a student could, with one additional year of study at Rice, earn an M.A. in economics.

To obtain an M.A., students must satisfy all requirements for Ph.D. candidacy. In particular, students must prepare original research (a prospectus) that could be developed into a Ph.D. dissertation. This work could be an extension or embellishment of a paper written as a senior independent research project (ECON 403–404). In some cases, and at the discretion of the thesis adviser, the paper produced in ECON 403–404 may fulfill this requirement. To obtain a Ph.D. candidacy, students also are required to take the qualifying exams in economic theory and a field examination in one specialized field within economics. These fields are listed in the section below on “Degree Requirements for the Ph.D. in Economics.”

The completion of a Ph.D. dissertation typically requires at least 1 additional year of research (but no additional courses) beyond the M.A.

Only highly motivated students with excellent aptitudes for economics and strong backgrounds in mathematics should consider substituting graduate for undergraduate courses. Typically, but not necessarily, such students will be majors in mathematical economic analysis. The course work in the graduate program would be most appropriate for students aiming for graduate study in economics or a related field such as finance.

Degree Requirements for Ph.D. in Economics

Preparation for Ph.D. Program. Applicants to the Ph.D. program should have had at least two semesters in calculus and one in linear algebra. Students who have not met these requirements may complete these prerequisites as Class III students (page 93) before being admitted to the graduate program. All applicants are required to take the Graduate Record Exam.

Requirements. For general university requirements, see Graduate Degrees (pages 72–73). Candidates for the Ph.D. degree usually spend from two to two and a half years in full-time course work and at least one year writing the dissertation; four to five years is a reasonable goal for completing the program. For the Ph.D., students must:

• Complete an approved program of at least 18 courses, including ECON 593–594 *Workshop in Economics I* and ECON 595–596 *Workshop in Economics II*
• Perform satisfactorily on written general examinations in economic theory
• Demonstrate proficiency in a major field by taking the relevant courses in that field and performing satisfactorily on a written examination
• Complete and defend orally a doctoral dissertation setting forth in publishable form the results of original research

See ECON (pages 302–308) in the Courses of Instruction section.