

# ECONOMICS

## THE SCHOOL OF SOCIAL SCIENCES

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### DEGREES OFFERED: BA, MA, PHD

Undergraduates may major in either economics or mathematical economic analysis (but not both). The major in mathematical economic analysis is recommended for students who intend to pursue graduate work in economics or a business or governmental job in which extensive analytical and quantitative skills are required.

Please note that it is primarily the responsibility of the student to satisfy all degree requirements, including the university credit requirements and university distribution requirements specified elsewhere in the *General Announcements*. Students are advised that the relevant departmental requirements are those in effect on the day that the student declares economics as their major. Major requirements are not reduced for students with multiple majors, although some courses can satisfy the requirements for more than one major.

The eight fields of specialization 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 BA IN ECONOMICS

1. All economics majors must complete a minimum of 10 courses with a grade point average of at least 2.0. When students repeat courses or complete more than the minimally required number of courses, the departmental GPA will be based on the set of courses that (i) satisfies all requirements for the degree and (ii) results in the highest GPA for the student.
2. The 10 courses counted for the degree must include the following:
  - ECON 211 *Principles of Economics*
  - ECON 370 *Microeconomic Theory*

- ECON 375 *Macroeconomic Theory*
- STAT 280 *Elementary Applied Statistics* or ECON 382/STAT 310 *Probability and Statistics*
- ECON 446 *Applied Econometrics* or ECON 400 *Econometrics*

Please note that ECON 370 lists MATH 101 (or the combination of MATH 111 and 112) as a prerequisite. We recommend that economics majors take MATH 101, STAT 280 (or ECON 382/STAT 310), ECON 211, and ECON 370 as early as possible. Because these courses are listed as prerequisites for more advanced courses, failure to take these courses in earlier years may cause scheduling problems in later years.

3. The remaining five courses must be selected from the following:

ECON 250 <i>Foundations of Public Sector Economics</i>	ECON 450 <i>World Economy and Social Development</i>
ECON 340 <i>Introduction to Game Theory</i>	ECON 451 <i>Economy of Latin America</i>
ECON 348 <i>Organizational Design</i>	ECON 452 <i>Religion, Ethics, and Economics</i>
ECON 355 <i>Financial Markets</i>	ECON 455 <i>Money and Financial Markets</i>
ECON 400 <i>Econometrics</i>	ECON 461 <i>Urban Economics</i>
ECON 403/404 <i>Senior Independent Research</i>	ECON 475 <i>Integer and Combinational Optimization</i>
ECON 415 <i>Labor Economics</i>	ECON 477 <i>Mathematical Structure of Economic Theory</i>
ECON 420 <i>International Trade</i>	ECON 479 <i>Economic Modeling and Public Policy</i>
ECON 421 <i>International Finance</i>	ECON 480 <i>Environmental Economics</i>
ECON 435 <i>Industrial Organization</i>	ECON 481 <i>Health Economics</i>
ECON 436 <i>Regulation</i>	ECON 482 <i>Distributive Justice: A Microeconomic Approach</i>
ECON 437 <i>Energy Economics</i>	ECON 483 <i>Public Finance: Tax Policy</i>
ECON 438 <i>Business, Law, and Economics</i>	ECON 484 <i>Public Expenditure Theory and Social Insurance</i>
ECON 439 <i>Torts, Property, and Contracts</i>	ECON 485/486 <i>Contemporary Economic Issues</i>
ECON 440 <i>Advanced Game Theory</i>	ECON 495/496 <i>Senior Seminar</i>
ECON 445 <i>Managerial Economics</i>	
ECON 447 <i>Advanced Topics in Energy Economics</i>	
ECON 448 <i>Corporate Finance</i>	
ECON 449 <i>Basics of Financial Engineering</i>	

No more than three of the 10 courses counted for the degree may be transferred from other schools if those courses are taken after matriculation at Rice. Additional transfer credits in economics may count toward meeting university graduation requirements but not toward fulfillment of the departmental major requirements. AP credits and credits awarded to transfer students for courses taken prior to matriculation at Rice are not counted against the limit on transfer courses, but all students must complete more than half of their upper-level major work at Rice. In order to receive transfer credit for ECON 211, students must pass a qualifying examination. Students wishing to take the ECON 211 qualifying examination must apply to the economics department office in Baker Hall 255. For additional information on transfer credits, consult "Procedures for Transfer Credit," available on the economics department's Web site at [www.ruf.rice.edu/~econ/undergrad.html](http://www.ruf.rice.edu/~econ/undergrad.html).

Qualifying students may graduate with departmental honors in economics by achieving a B+ (3.33) average in the 10 courses counted for the degree and completing two semesters of independent research. For additional information on the requirements for honors in economics, consult the economics department's Web site at [www.ruf.rice.edu/~econ/undergrad.html](http://www.ruf.rice.edu/~econ/undergrad.html).

## DEGREE REQUIREMENTS FOR BA IN MATHEMATICAL ECONOMIC ANALYSIS

1. All MTEC majors must complete a minimum of 16 courses with a grade point average of at least 2.00. When students repeat courses or complete more than the minimally required number of courses, the departmental GPA will be based on the set of courses that (i) satisfies all requirements for the degree and (ii) results in the highest GPA for the student.
2. The 16 courses counted for the degree must include the following:

### **(a) Five courses in mathematics and statistics**

MATH 101 *Single Variable Calculus I*

MATH 102 *Single Variable Calculus II*

MATH 211 *Ordinary Differential Equations or*  
MATH 355 *Linear Algebra or CAAM 335 Matrix*  
*Analysis*

MATH 212 *Multivariable Calculus or MATH*  
*221 Honors Calculus III*

ECON 382/STAT 310 *Probability and Statistics*  
or STAT 410 *Introduction into Regression and*  
*Statistical Computing or STAT 431 Overview of*  
*Mathematical Statistics*

### **(b) One course in econometrics**

ECON 400 *Econometrics*

### **(c) Four courses in economic theory**

ECON 211 *Principles of Economics*

ECON 370 *Microeconomic Theory*

ECON 375 *Macroeconomic Theory*

ECON 477 *Mathematical Structure of*  
*Economic Theory*

### **(d) Four courses in applied economics, selected from**

ECON 250 *Foundations of Public Sector*  
*Economics*

ECON 340 *Introduction to Game Theory*

ECON 348 *Organizational Design*

ECON 355 *Financial Markets*

ECON 415 *Labor Economics*

ECON 420 *International Trade*

ECON 421 *International Finance*

ECON 435 *Industrial Organization*

ECON 436 *Regulation*

ECON 437 *Energy Economics*

ECON 438 *Business, Law, and Economics*

ECON 439 *Torts, Property, and Contracts*

ECON 440 *Advanced Game Theory*

ECON 445 *Managerial Economics*

ECON 446 *Applied Economics*

ECON 447 *Advanced Topics in Energy*  
*Economics*

ECON 448 *Corporate Finance*

ECON 449 *Basics of Financial Engineering*

ECON 450 *World Economy and Social*  
*Development*

ECON 451 *Economy of Latin America*

ECON 452 *Religion, Ethics, and Economics*

ECON 455 *Money and Financial Markets*

ECON 461 *Urban Economics*

ECON 475 *Integer and Combinational*  
*Optimization*

ECON 479 *Economic Modeling and*  
*Public Policy*

ECON 480 *Environmental Economics*

ECON 481 *Health Economics*

ECON 482 *Distributive Justice: A*  
*Microeconomic Approach*

ECON 483 *Public Finance: Tax Policy*

ECON 484 *Public Expenditure Theory and*  
*Social Insurance*

ECON 485/486 *Contemporary Economic Issues*

### **(e) One semester of ECON 403/404 Senior Independent Research**

***(f) One additional 400-level course in applied economics as listed in (d) or one additional semester of ECON 403/404 Senior Independent Research or an equivalent or higher level course approved in advance by the chair of the Undergraduate Committee***

No more than three of the required economics courses and two of the required mathematics (or computational and applied mathematics or statistics) courses may be transferred from other schools if those courses are taken after matriculation at Rice. Additional transfer credits in economics, mathematics, computational and applied mathematics, or statistics may count toward meeting university graduation requirements but not toward fulfillment of the departmental major requirements.

AP credits and credits awarded to transfer students for courses taken prior to matriculation at Rice are not counted against the limit on transfer courses, but all students must complete more than half of their upper-level major work at Rice. In order to transfer ECON 211, students must pass a qualifying examination. Students wishing to take the ECON 211 qualifying examination must apply to the economics department office in Baker Hall 255. For additional information on transfer credits, consult “Procedures for Transfer Credit,” available on the economics department’s Web site at [www.ruf.rice.edu/~econ/undergrad.html](http://www.ruf.rice.edu/~econ/undergrad.html).

Qualifying students may graduate with departmental honors in mathematical economic analysis by achieving a B+ (3.33) average in the 16 courses counted for the degree. For additional information on the requirements for honors in mathematical economic analysis, consult the economics department’s Web site at [www.ruf.rice.edu/~econ/undergrad.html](http://www.ruf.rice.edu/~econ/undergrad.html).

### CONCENTRATION IN BUSINESS ECONOMICS

Students who complete the requirements for a major in economics or a major in mathematical economic analysis also may request a certification from the department that they have completed the requirements for a concentration in business economics. To qualify, a student must complete the following courses with minimum grade point average of at least 2.0:

1. ACCO 305/BUSI 305 *Introduction to Accounting*
2. The following electives for the economics or mathematical economic analysis major:

ECON 355 *Financial Markets*

ECON 438 *Business, Law, and Economics*

ECON 445 *Managerial Economics*

ECON 448 *Corporate Finance*

Note that to complete their major requirements, economic majors will need to choose one additional 400-level elective beyond those chosen to satisfy requirement two.

**Substituting Economics Graduate Courses for Undergraduate Courses**—Undergraduate majors satisfying the course prerequisites may, subject to the approval of the instructor and of the departmental undergraduate committee chair, substitute certain graduate courses for undergraduate courses. Only highly motivated students with excellent aptitudes for economics and a strong background in mathematics should consider making such substitutions. Typically, but not necessarily, such students will be majors in mathematical economic analysis. Permitted substitutions are as follows:

- ECON 501 for ECON 370 (if student has completed ECON 211 at Rice)
- ECON 502 for ECON 375
- ECON 504 for ECON 382
- ECON 510 for ECON 400

- Furthermore, ECON 505 and ECON 508 also may be taken by undergraduates and may be used toward satisfying MTEC requirements. Specifically, ECON 505 could be used as one of the courses in the applied economics category or in the advanced analysis category, while ECON 508 could be used only in the advanced analysis category.

Note that this set of substitutable graduate courses includes six of the seven courses required during the first year of the PhD program at Rice. Accordingly, such advanced course work would be excellent preparation for graduate study in economics or in some related field such as finance. Taking such graduate courses also should open more opportunities for the student who will be seeking employment immediately after graduation.

### THE FIVE-YEAR MA PROGRAM

Advanced undergraduate students can, subject to the approval of the Economics Department Undergraduate Committee, enter our five-year MA program. In this program, a student who has taken advantage of the full menu of graduate course substitutions available could, with an additional year of study at Rice, earn an MA in economics.

To obtain the MA degree, students must satisfy all of the requirements for PhD candidacy. In particular, students must pass general examinations in microeconomic theory and in macroeconomic theory and econometrics, must pass an examination in a specialized field of study in economics, and must complete an original research project (a dissertation prospectus) that could be developed into a PhD dissertation under the supervision of a faculty member. This work could be an extension of a paper written as a senior independent research project (ECON 403/404). In some cases, at the discretion of the independent research advisor, the paper produced in ECON 403/404 may fulfill this requirement. Finally, the first-year graduate requirement to take ECON 507 Mathematical Economics would be waived with the approval of the departmental five-year MA advisor.

Note that any student who subsequently decides to enter the economics PhD program at Rice would be given graduate credit for all 500-level economics courses completed while an undergraduate. The completion of the PhD dissertation typically requires at least one additional year of research (but no additional courses) beyond the MA degree.

Students who opt for the five-year MA degree program will have different backgrounds and interests on entering Rice and will choose to pursue this option at different stages in their academic careers. The following illustrates two (of many) possible paths to satisfying the MTEC major requirements, while at the same time completing all of the requirements for the MA degree over a five-year period.

### COURSES: SAMPLE PATH ONE

The student enters with AP credit for ECON 211 and MATH 101/102 and has an early interest in the five-year MA program.

#### *Freshman Year*

ECON 370, 375, 477, and MATH 211/212

#### *Sophomore Year*

ECON 501; 1 course from Applied Economics category; and MATH 355 or CAAM 310

#### *Junior Year*

ECON 502, 504, 505, 510, and 1 course from Applied Economics category

#### *Senior Year*

ECON 403/404 and ECON 508

#### *Fifth Year*

Complete all remaining graduate courses and pass all remaining examinations required to achieve PhD candidacy.

**COURSES: SAMPLE PATH TWO**

The student has no relevant AP credit and/or decides to enter the five-year MA program only near the end of the sophomore year.

***Freshman Year***


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ECON 211 and MATH 101/102

***Sophomore Year***


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ECON 370, 375, 477, and 1 course from applied economics category; MATH 211/212

***Junior Year***


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ECON 501, 502, 505, 508; MATH 355  
or CAAM 310

***Senior Year***


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ECON 504, 510, 403/404, and 1 course from applied economics category

***5th Year***


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Complete all remaining graduate courses and pass all remaining examinations required to achieve PhD candidacy.

**DEGREE REQUIREMENTS FOR PHD IN ECONOMICS**

**Preparation for PhD Program.** Applicants to the PhD 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 (Graduate Students section, pages 24–25) 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 (Graduate Students section, page 3–4). Candidates for the PhD 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 PhD, students must:

- Complete an approved program of at least 18 courses (including approved courses in other departments), no more than four of which are research workshops
- Perform satisfactorily on the written general examinations in microeconomics, macroeconomics, and econometrics
- 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 in the Courses of Instruction section.**