ECONOMICS AND MATHEMATICS (BA)

Department Website (http://math.nyu.edu)

NYSED: 19735 **HEGIS:** 1799.00 **CIP:** 27.9999

Program Description

This interdisciplinary major offered jointly by the Departments of Economics and Mathematics provides students an opportunity to study both economics and such relevant mathematical subjects as analysis, algebra, probability, statistics, mathematical modeling, and math finance.

The Department of Economics prepares students to understand individual and group decision-making, the structure of markets and economies, and the relationship between regions within the global economy. Although the department is large, its students enjoy an excellent student-faculty rapport. By being able to study with faculty who are actively engaged in research, students learn not only about the fundamentals of economic theory but also how such theory is utilized. They have the opportunity to conduct research on their own. Honors students are required to write an honors thesis under direct faculty supervision.

Students majoring in Economics have many options open to them after graduation. The major prepares them for graduate school in economics, business management, or public administration. Preprofessional students will find that an Economics major not only fosters the discipline medical or law school demands but provides a solid foundation for these and other careers. Employers and professional schools appreciate the skills acquired by Economics students and hire Economics majors because they can think quantitatively, qualitatively, and analytically. Studying Economics at New York University is especially rewarding because of its urban environment. Students often find career opportunities on Wall Street, at the United Nations, or in various corporate, financial, governmental, agency, and nonprofit institutional settings.

The Department of Mathematics is part of the Courant Institute of Mathematical Sciences, an independent division of New York University. Based in Warren Weaver Hall, at the heart of New York University's Washington Square campus, it is one of the top-ranked mathematics departments worldwide, renowned for its pioneering history in the field of applied mathematics. Mathematics majors are encouraged to spend a semester studying away. Currently, mathematics courses are offered at NYU Abu Dhabi, NYU London, NYU Paris, and NYU Shanghai.

Honors Program in Economics and Mathematics

Students with a 3.65 overall and major GPA may apply for joint honors in Economics and Mathematics. Honors students are required to take twenty 4-credit courses (80 credits). Interested students must consult with the directors of undergraduate studies in both departments for advisement and for permission to enter the honors program, ideally early during sophomore year so they can begin preparing. Honors students must participate in a year-long research program in their senior year and write a thesis under faculty supervision. Note that students may satisfy their research requirement with either the economics honors sequence (ECON-UA 410 and 450), mathematics independent study (MATH-UA 997 and 998), or the SURE or AM-SURE program in the Department of Mathematics.

Students may complete the honors research project requirement at either department. A research project completed at the math department will be cross-honored by the economics department and vice versa. That being said, once a student commits to completing a research project at one department, they must satisfy the research requirements and abide by the policies of that department.

To complete the honors research project requirement at the economics department, students must begin the three-course honors sequence no later than the spring semester of their junior year:

1. ECON-UA 266 Introduction to Econometrics
2. ECON-UA 410 Honors Tutorial
3. ECON-UA 450 Honors Thesis
    - Students are expected to dedicate 10-20 hours per week toward their research.

To satisfy the research project requirement at the math department, students have two options:

1. To participate in the mathematics Summer Undergraduate Research Experience (https://math.nyu.edu/dynamic/undergrad/ba-cas/activities-research/summer-undergraduate-research-experience/) (S.U.R.E.) program under faculty supervision. Students who participate in this program are expected to dedicate 30+ hours of research per week over a 10-12 week period during the summer break. Upon concluding their research, students are required to submit an abstract and present their research at Courant's undergraduate research forum in the fall semester of their senior year. This is a competitive program with only a select number of spots. Students who are selected to participate will receive financial support for the summer.
    - Honors students interested in the SURE route must apply at the beginning of the spring semester of their junior year.
2. Alternatively, students must complete two (2) semesters of research independent study (MATH-UA 0997, 0998 (https://math.nyu.edu/dynamic/undergrad/ba-cas/independent-study/)) under faculty supervision. Students are expected to dedicate 10-20 hours per week toward their research. Students must receive approval of their honors project from the honors faculty adviser, Professor Chao Li. At the conclusion of the second research independent study, students are required to submit a 15-20 page final report, with the approval of their faculty mentor, and are encouraged to present their research at the Dean's Undergraduate Research Conference (DURC) in the spring semester of their senior year.
    - Joint Math/Econ honors majors not selected for the SURE program must satisfy the research project requirement via the independent study route at the math department or the three-course honors sequence at the economics department.

Course	Title	Credits
Economics Requirements		
ECON-UA 1	Introduction to Macroeconomics	4
ECON-UA 2	Introduction to Microeconomics	4
ECON-UA 11	Microeconomic Analysis	4
ECON-UA 13	Macroeconomic Analysis	4
ECON-UA 20	Analytical Statistics [1]	4
ECON-UA 266	Intro to Econometrics	4

Select three economics electives [2]		12
ECON-UA 410	Honors Tutorial	4
ECON-UA 450	Honors Thesis I [3]	4
Mathematics Requirements [4, 5]		
MATH-UA 131	Mathematics for Economics I	4
or MATH-UA 121	Calculus I	
MATH-UA 132	Mathematics for Economics II	4
or MATH-UA 122	Calculus II	
MATH-UA 133	Mathematics for Economics III	4
or MATH-UA 123	Calculus III	
or MATH-UA 129	Honors Calculus III	
MATH-UA 140	Linear Algebra	4
or MATH-UA 148	Honors Linear Algebra	
MATH-UA 328	Honors Analysis I	4
Select two electives from the following:		8
MATH-UA 240	Combinatorics	
MATH-UA 248	Theory of Numbers	
MATH-UA 250	Mathematics of Finance	
MATH-UA 251	Intro to Math Modeling	
MATH-UA 262	Ordinary Diff Equations	
or MATH-UA 268	Honors Ordinary Differential Equations	
MATH-UA 263	Partial Diff Equations	
MATH-UA 264	Chaos & Dynamical Systems	
MATH-UA 329	Honors Analysis II	
MATH-UA 333	Theory of Probability	
or MATH-UA 338	Honors Theory of Probability	
MATH-UA 334	Mathematical Statistics	
MATH-UA 343	Algebra	
or MATH-UA 348	Honors Algebra I	
MATH-UA 349	Honors Algebra II	
MATH-UA 352	Numerical Analysis	
or MATH-UA 358	Honors Numerical Analysis	
MATH-UA 353	Linear and Nonlinear Optimization	
MATH-UA 375	Topology	
MATH-UA 377	Differential Geometry	
MATH-UA 382	Functions of a Complex Variable	
MATH-UA 393	Honors I	
or MATH-UA 394	Senior Honors II	
or MATH-UA 397	Honors III	
or MATH-UA 398	Honors IV	
Honors Electives		
Select two honors electives from the following:		8
MATH-UA 268	Honors Ordinary Differential Equations	
MATH-UA 329	Honors Analysis II	
MATH-UA 338	Honors Theory of Probability	
MATH-UA 348	Honors Algebra I	
or MATH-UA 349	Honors Algebra II	
MATH-UA 358	Honors Numerical Analysis	
MATH-UA 393	Honors I	
or MATH-UA 394	Senior Honors II	
or MATH-UA 397	Honors III	
or MATH-UA 398	Honors IV	
Total Credits		**80**

1 If not taking MATH-UA 334 Mathematical Statistics

2 At least two must be theory electives numbered ECON-UA 300-399. Note that students who take MATH-UA 334 Mathematical Statistics instead of ECON-UA 20 Analytical Statistics for the statistics requirement must take a total of four ECON-UA electives.

3 Alternates: Independent Study (MATH-UA 997 and 998), or the SURE or AM-SURE programs in the Department of Mathematics.

4 It is advised that students pursuing or intending to pursue the joint major in Economics and Mathematics complete the Mathematics for Economics sequence and not the regular Calculus sequence.

5 Courses from the traditional Calculus sequence (MATH-UA 121 Calculus I, MATH-UA 122 Calculus II, MATH-UA 123 Calculus III) and the Mathematics for Economics Sequence (MATH-UA 131 Mathematics for Economics I, MATH-UA 132 Mathematics for Economics II, MATH-UA 133 Mathematics for Economics III) cannot both be applied to the Joint Math/Economics Major. Students must take Calculus I through III OR Mathematics for Economics I through III. Students cannot mix-and-match, combine, or double-count between the Calculus and Mathematics for Economics sequences. Also note that students cannot register simultaneously for separate courses within the two sequences.

Admissions

New York University's Office of Undergraduate Admissions supports the application process for all undergraduate programs at NYU. For additional information about undergraduate admissions, including application requirements, see How to Apply (https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html).

Program Requirements

The joint major in Economics and Mathematics requires 18 4-credit courses (72 credits), nine from each department, as outlined below. Students must follow the Theory track (not the Policy track) in Economics. A grade of C or better is necessary in all courses used to fulfill joint major requirements; courses graded Pass/Fail do not count. Interested students should consult with the directors of undergraduate studies in both departments for additional information.

Course	Title	Credits
General Education Requirements		
First-Year Seminar		4
EXPOS-UA 1	Writing as Inquiry	4

Foreign Language [1]		16
Physical Science		4
Life Science		4
Texts and Ideas		4
Cultures and Contexts		4
Expressive Culture		4
Major Requirements		
Foundational Mathematics Requirements [2, 3]		
MATH-UA 131	Mathematics for Economics I	4
or MATH-UA 121	Calculus I	
MATH-UA 132	Mathematics for Economics II	4
or MATH-UA 122	Calculus II	
MATH-UA 133	Mathematics for Economics III	4
or MATH-UA 123	Calculus III	
or MATH-UA 129	Honors Calculus III	
MATH-UA 140	Linear Algebra	4
or MATH-UA 148	Honors Linear Algebra	
MATH-UA 325	Analysis	4
or MATH-UA 328	Honors Analysis I	
Four (4) advanced math electives from the following list:		16
MATH-UA 240	Combinatorics	
MATH-UA 248	Theory of Numbers	
MATH-UA 250	Mathematics of Finance	
MATH-UA 251	Intro to Math Modeling	
MATH-UA 262	Ordinary Diff Equations	
or MATH-UA 268	Honors Ordinary Differential Equations	
MATH-UA 263	Partial Diff Equations	
MATH-UA 264	Chaos & Dynamical Systems	
MATH-UA 329	Honors Analysis II	
MATH-UA 333	Theory of Probability	
or MATH-UA 338	Honors Theory of Probability	
MATH-UA 334	Mathematical Statistics	
MATH-UA 343	Algebra	
or MATH-UA 348	Honors Algebra I	
MATH-UA 349	Honors Algebra II	
MATH-UA 352	Numerical Analysis	
or MATH-UA 358	Honors Numerical Analysis	
MATH-UA 375	Topology	
MATH-UA 377	Differential Geometry	
MATH-UA 382	Functions of a Complex Variable	
MATH-UA 393	Honors I	
MATH-UA 394	Senior Honors II	
MATH-UA 397	Honors III	
MATH-UA 398	Honors IV	
Economics Requirements		
ECON-UA 1	Introduction to Macroeconomics	4
ECON-UA 2	Introduction to Microeconomics	4
ECON-UA 11	Microeconomic Analysis	4
ECON-UA 13	Macroeconomic Analysis	4
ECON-UA 20	Analytical Statistics [4]	4
or MATH-UA 334	Mathematical Statistics	
ECON-UA 266	Intro to Econometrics	4
Electives		
Select three economics electives [5]		12
Other Elective Credits		12
Total Credits		**128**

1. The foreign language requirement is satisfied upon successful completion through the Intermediate level of a language. This may be accomplished in fewer than 16 credits, but those credits must then be completed as elective credit.
2. It is advised that students pursuing or intending to pursue the joint major in Economics and Mathematics complete the Mathematics for Economics sequence and not the regular Calculus sequence.
3. Courses from the traditional Calculus sequence (MATH-UA 121 Calculus I, MATH-UA 122 Calculus II, MATH-UA 123 Calculus III) and the Mathematics for Economics Sequence (MATH-UA 131 Mathematics for Economics I, MATH-UA 132 Mathematics for Economics II, MATH-UA 133 Mathematics for Economics III) cannot both be applied to the Joint Math/Economics Major. Students must take Calculus I through III OR Mathematics for Economics I through III. Students cannot mix-and-match, combine, or double-count between the Calculus and Mathematics for Economics sequences. Also note that students cannot register simultaneously for separate courses within the two sequences.
4. Students taking the MATH-UA 334 Mathematical Statistics option must complete one additional ECON-UA elective (four total).
5. At least two must be theory electives numbered ECON-UA 300 to 399.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
MATH-UA 131	Mathematics for Economics I	4
ECON-UA 2	Introduction to Microeconomics	4
Texts and Ideas		4
First-Year Seminar		4
	Credits	**16**
2nd Semester/Term		
MATH-UA 132	Mathematics for Economics II	4
ECON-UA 1	Introduction to Macroeconomics	4
Cultures and Contexts		4
EXPOS-UA 1	Writing as Inquiry	4
	Credits	**16**
3rd Semester/Term		
MATH-UA 133	Mathematics for Economics III	4
MATH-UA 140 or MATH-UA 148	Linear Algebra or Honors Linear Algebra	4
ECON-UA 11	Microeconomic Analysis	4
Foreign Language I		4
	Credits	**16**

4th Semester/Term		
MATH-UA 325 or MATH-UA 328	Analysis or Honors Analysis I	4
ECON-UA 13	Macroeconomic Analysis	4
ECON-UA 20	Analytical Statistics	4
Foreign Language II		4
	Credits	**16**
5th Semester/Term		
Advanced Math Elective (1 of 4) [1]		4
ECON-UA 266	Intro to Econometrics	4
Foreign Language III		4
Expressive Culture		4
	Credits	**16**
6th Semester/Term		
Advanced Math Elective (2 of 4) [1]		4
Major Elective (200-Level) in Economics [2]		4
Foreign Language IV		4
Other Elective Credits		4
	Credits	**16**
7th Semester/Term		
Advanced Math Elective (3 of 4) [1]		4
Major Elective (300-Level) in Economics (#1 of 2)		4
Physical Science		4
Other Elective Credits		4
	Credits	**16**
8th Semester/Term		
Advanced Math Elective (4 of 4) [1]		4
Major Elective (300-Level) in Economics (#2 of 2)		4
Life Science		4
Other Elective Credits		4
	Credits	**16**
	Total Credits	**128**

[1] See Curriculum (p. 2) for the specific list of advanced mathematics elective courses, or contact the Department of Mathematics.

[2] All ECON-UA electives must be drawn from Theory Concentration offerings.

Learning Outcomes

Upon completion of program requirements, students are expected to have acquired:

1. A substantial knowledge of microeconomics, macroeconomics, and econometrics in both theory and application.
2. The ability to analyze stylized problems using an economic framework and to extend these skills to the analysis of real-world applications.
3. The skills to use statistical models that enable them to conduct quantitative analyses of a wide variety of economic problems.
4. The ability to read, analyze, and clearly explain the economic theory underlying modern economic research.
5. The skills to construct their own behavioral models for use in economics research.
6. Proficiency in the foundations of modern mathematics, including discrete mathematics, calculus, analysis, and algebra.
7. The ability to communicate mathematically, including understanding, developing, and critiquing mathematical arguments and rigorous proofs.
8. The skills to apply mathematical ideas and methods to questions and problems both within and outside of the mathematical sciences.
9. Advanced knowledge in some specific areas of mathematics, such as differential equations, geometry and topology, complex analysis, probability and statistics, number theory, or numerical analysis.
10. Experience in using appropriate technology to calculate, visualize, and model problems.

Policies

Program Policies

Policies Applying to the Major

Please also see the footnotes on the Curriculum (p. 2) and Sample Plan of Study (p. 3) tabs; policies found there are not repeated below.

1. Students may double-count no more than two courses between the requirements of this joint major and those of any other major or minor. All departments involved must agree to the double-counting.
2. In accordance with CAS policy, nine 4-credit courses (36 credits) of the 18 4-credit courses (72 credits) required for this joint major must be taken in the College of Arts and Science. Transfer students typically complete at least four 4-credit ECON-UA courses (16 credits) and four 4-credit MATH-UA courses (16 credits) for this major in CAS, as well as one additional course in either department to meet the major's 36-credit residency requirement. Transfer students to the College must pay careful attention to these rules.

Required Coursework in CAS (-UA) for all Majors and Minors in Courant

At least half of the courses applied to the Courant requirements of the CAS majors and minors in Computer Science and in Mathematics (including joint programs) must be CSCI-UA and MATH-UA courses taken in New York or at NYU study away sites. This is a built-in limit on how many courses students may take in these subjects that are (for example) sponsored by NYU Abu Dhabi and NYU Shanghai under CS-UH, MATH-UH, CENG-SHU, CSCI-SHU, and MATH-SHU. Internal and external transfers must pay close attention to this policy, but it also applies to students who matriculate as first-years. The usual CAS policies on -UA residency for the baccalaureate degree still apply.

NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

College of Arts and Science Policies

A full list of relevant academic policies can be found on the CAS Academic Policies page (https://bulletins.nyu.edu/undergraduate/arts-science/academic-policies/).