

DEPARTMENT OF MATHEMATICS

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THE UNDERGRADUATE PROGRAM IN MATHEMATICS

This brochure is a brief introduction to the undergraduate mathematics program at Rutgers University, New Brunswick/Piscataway. For more information, consult the departmental web site:

www.math.rutgers.edu

GENERAL INFORMATION

The Department of Mathematics offers about 35 advanced undergraduate courses each year. The diversity and richness of this selection, matched by only a small number of U.S. colleges and universities, is a real asset for students interested in the mathematical sciences. The Department includes about 80 faculty members, with interests ranging over all areas of mathematics.

A primary role of the undergraduate program in mathematics is to help students fulfill requirements in other academic disciplines. Substantial amounts of mathematics are required of students majoring in a wide variety of disciplines, including engineering, business, and the social, biological, and physical sciences. Moreover, most students must fulfill a mathematics requirement for graduation.

The Department of Mathematics also has a rigorous program for a major in mathematics, and graduates about 100 majors each year.

Over 20,000 students enroll each year in undergraduate mathematics courses during the fall, spring, and summer terms at Rutgers.

JOBS AFTER GRADUATION

Most mathematics majors from Rutgers take positions providing mathematical support for industry, banking, brokerage, and insurance. Many teach in the high schools. Some go on to graduate or professional school in subjects such as statistics, computer science, mathematics, operations research, engineering, law,

business, or medicine. For more information, see the link "Careers in Math" on the departmental web site.

THE MAJOR IN MATHEMATICS

To be admitted into the mathematics major program, a student must normally have completed three terms of calculus with a grade of C or better. Satisfactory progress for a full-time student normally requires completion of at least one mathematics course each term, at an appropriate level, with a grade of C or better. To complete the mathematics major in either of its options, a student must receive grades of C or better in each of 01:640:250, 251, 252, and 300, and in all but at most one of the further mathematics courses counted toward the major. Moreover, a student must receive grades of C or better in all courses from other departments (such as computer science) used to fulfill the requirements of the mathematics major.

At least four upper-level math courses, including an analysis course (Math 311, 312, 411, or 412) and an algebra course (Math 350, 351, 352, 451, or 452), must be taken at RU–New Brunswick/Piscataway. The Mathematical Reasoning course, Math 300, is a pre-requisite for the advanced calculus and abstract algebra courses Math 311, 350, and 351, and several other upper-level mathematics courses.

All mathematics majors must complete:

1. Three terms of Calculus (typically Math 151, 152, and 251),
2. Introductory Linear Algebra (Math 250),
3. Differential Equations (Math 252),
4. Introduction to Computing for Mathematics and the Sciences (CS, 01:198:107), or Introduction to Computer Science (CS, 01:198:111),
5. All of the required upper-level courses for one of the three options described in the next section

This description has been condensed—see the online catalog for the authoritative version of these requirements:
www.math.rutgers.edu/courses/RUCatalogs.html

THE MAJOR IN MATHEMATICS (Cont'd)

Option A. Standard Mathematics Major

Eight additional 3-credit courses in Mathematics

(Subject code 640) at the 300-400 level. Three of these must be:

1. Introduction to Math Reasoning (Math 300)
2. *Either* Advanced Calculus (Math 311 or 312) *or* Analysis I (Math 411), and,
3. *Either* Linear Algebra (Math 350), or an Abstract Algebra course (Math 351, 352, or 451).

The remaining five courses may be chosen from any three-credit offerings of the Department. See the departmental website or the university catalogue for a list of such courses. An appropriate graduate course at Rutgers may be substituted for the required analysis and/or algebra course, with departmental approval.

Option B. The Honors Track

The Department of Mathematics offers an *Honors Track*, designed to provide qualified students with an experience of mathematics that is richer, more rigorous, and more personal than is provided by the standard major. It is especially (but not exclusively) intended for students aiming to do graduate work

in Mathematics or a related field. The honors track course of study is personalized for each student (in consultation with their faculty advisor and the honors committee), and will normally include the demanding advanced honors sequences 01:640:411-412 and 01:640:451-452, as well as two semesters of one-credit honors seminar, including at least one semester of 01:640:492. Students who successfully complete the Honors Track are eligible to graduate with a B.S. in Mathematics.

Students interested in the honors track should submit an application (available online and in Hill 303.) Admission is on a rolling basis: applications are

kept active and reevaluated each semester, with students being admitted once they have compiled a strong enough record to demonstrate their ability to complete the program. Students interested in and potentially qualified for the honors track are encouraged to take honors sections of calculus and (especially) 01:640:300.

Option C. Actuarial Track

The Mathematics Department offers an Actuarial Mathematics Option for those students who want to enter the actuarial profession upon graduation. Graduates of this option have the foundation needed to prepare for three of the Society of Actuaries Exams (P, FM, and LTAM), and to earn certifications in statistical and economic subject areas once the student enters into the profession.

Generally, students who want to become actuaries will seek an internship with an insurance company or consulting firm between their junior and senior years. Many of these firms actively recruit at Rutgers through Rutgers Career Services.

Some students interested in the actuarial profession should consider a major in mathematics and a minor in economics, or a double major in mathematics and economics, rather than the Actuarial Mathematics option. This includes students who intend to pursue a broader mathematical education, possibly including graduate studies in mathematics, as well as those planning to continue on to graduate study in Mathematical Finance.

INTERDISCIPLINARY MAJORS

_ In addition to the two options listed above, the Department offers these interdisciplinary majors:

Statistics-Mathematics Interdisciplinary Major (curriculum code 960): This major is administered by the Department of Statistics. For more information,

consult Prof. Harold Sackrowitz, of that department. (see statistics.rutgers.edu)

Bio-Mathematics Interdisciplinary Major (curriculum code 122): This major is administered by the Department of Mathematics; for details consult the head mathematics advisor or see the web site of this major: biomath.rutgers.edu

FIVE-YEAR B.A./M.A. PROGRAMS

In the five-year Bachelor's/Master's programs at Rutgers, students take extra credits before graduating from college. These credits can then be transferred to the Master's program. With careful planning, the Master's degree can be obtained in one year of full-time study after the completion of the Bachelor's degree.

Students apply in their third year, but planning is needed well in advance. Interested students should consult the second department involved, and the Mathematics Advisor, as early as possible, ideally at the beginning of their first term at Rutgers.

Rutgers offers these five-year B.A./M.A. programs:

1. Mathematics Education
2. Industrial and Systems Engineering
3. Statistics
4. Mathematical Finance

The Mathematics Education five-year program leads to certification as a teacher.

For details, see the website:

www.math.rutgers.edu/undergrad/ba-ms-tracks.html

DEPARTMENTAL HONORS PROGRAMS

The Department offers or participates in several honors programs, which are related to each other, but distinct. One of them is the Honors Track, mentioned above.

Eligible first-year students and sophomores may take 01:640:192, 291, or 292, which are honors courses in second-, third-, and fourth-term calculus, respectively, or honors sections of the standard

calculus sequence 151, 152, 251. The Department offers two honors seminars and a mathematics problem-solving seminar. It occasionally offers honors sections of other courses. Entry into these classes is determined by the Department and is based on a student's previous performance in mathematics.

To graduate with departmental honors, a mathematics major must maintain an average of at least 3.4 in mathematics courses and must successfully complete two approved honors units, which may for example be Math 411, 412, 451, 452, or certain graduate courses. For more details, contact the head mathematics advisor and see the website of the honors programs:

www.math.rutgers.edu/undergrad/Honors

THE MINOR IN MATHEMATICS

A minor in mathematics requires:

1. Three terms of Calculus (Math 151, 152, 251).
2. Introductory Linear Algebra (Math 250).
3. Grades of C or better in Math 250 and 251.
4. Four additional 3-credit courses chosen from Math 252 and 300 or 400 level mathematics courses, with a grade of C or better in at least three of the four.

*At least three of the elective courses must be taken at RU—
New Brunswick/Piscataway.*

ADVISING

Each math major should see an advisor in the Department at least once each semester, during the process of registering for the following semester. The head advisor maintains regular hours during the term.

For information on advisors, email

advisor@math.rutgers.edu or see

www.math.rutgers.edu/undergrad/Advisor.

OPPORTUNITIES FOR ADVANCED STUDY

The Graduate Program in Mathematics at Rutgers is one of the outstanding programs in the United States. Undergraduates, with the consent of the Department, may take courses in this program. Information on how to do this may be obtained at the departmental

web site or by contacting the head mathematics advisor.

EMPLOYMENT OPPORTUNITIES

Students may apply to the Department to become graders or learning assistants. Hiring decisions are based primarily on the strength of the applicant's academic record at Rutgers. Positions may also be available as tutors at the Learning Resource Center.

UNDERGRADUATE RESEARCH IN MATHEMATICS

During the academic year, interested students can get a taste of mathematical research by working individually with a professor. Participating students are expected to have a strong mathematical background, and good computer skills may also be required. Graduation credit is available for such projects (with prior departmental approval). Sometimes a stipend may be received, but credit and stipend will not both be given for the same work.

Our Department and the Rutgers Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) both offer summer Research Experiences for Undergraduates (REUs) in mathematics. Typically these are residential programs, in which each student carries out a research project under the direction of a faculty advisor, participating in seminars and other professional activities. Participants receive a stipend and housing. For information on our REU programs see dimacs.rutgers.edu/REU, and see www.nsf.gov/crssprgm/reu/ for similar programs nationwide.