

## MATHEMATICS

[www.math.neu.edu](http://www.math.neu.edu)

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Mathematics is of ever-increasing importance to our society and everyday life. It has long been the language of science and technology, and provides a rich source of methods for analyzing and solving problems encountered in the physical world. Today, mathematics is essential in virtually all fields of human endeavor, including business, the arts, and the social sciences.

The Bachelor of Arts degree requires at least eleven mathematics courses and two physics courses, in addition to the study of a foreign language; this program is appropriate for students who wish a broader liberal arts education. The Bachelor of Science degree requires at least fourteen mathematics courses and two physics courses but no foreign language study; it is more specialized, and it is recommended for those strongly interested in mathematics and science. The department also offers a minor degree in mathematics.

The major programs provide flexibility with elective courses. Students may take advantage of a range of interdisciplinary programs and may join a major in mathematics with one in such fields as computer science, physics, and biology.

Exceptional students are accepted into the Honors Program, and have the option to enroll in honors sections of several of their mathematics courses. All math majors may benefit from co-op opportunities in the scientific and business communities in Boston and elsewhere.

Many of the mathematics courses that we offer use computers for visualization, modeling, and numerical approximation. The math computer lab features twenty-two personal computers supported by student mentors in a pleasant physical environment.

Students planning to teach secondary-school mathematics must major in mathematics and take a specific minor in education, which includes course work and student teaching.

Mathematical training may lead to opportunities in applied research (natural sciences, engineering, economics, management, computer science) as well as in mathematical research, teaching, or industry.

### Transferring to the Major

Upperclass students transferring to mathematics must have a cumulative GPA of at least 2.000. They must also have at least a 2.000 GPA in all mathematics courses and a minimum grade of C in the following courses (if already taken):

MTH U165	Introduction to Mathematical Reasoning	4 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U371	Linear Algebra	4 SH

Acceptance in the major will be based on students' meeting the department's criteria for admission and availability of space in the major.

### Academic Progression Standards

Students who begin as freshman mathematics majors must, after the fourth semester, satisfy the following: (a) have completed at least six of their required mathematics and physics courses; (b) have a grade average of C or better in the following courses:

MTH U165	Introduction to Mathematical Reasoning	4 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U371	Linear Algebra	4 SH

and (c) have a GPA of at least 2.000 in all required mathematics and physics courses.

Students who transfer to the major must, after two semesters in the major, satisfy the following: (a) have completed at least four of their required mathematics and physics courses; (b) have a GPA of at least 2.000 in all required mathematics and physics courses; and (c) have grades of C or better in the following courses (if already taken):

MTH U165	Introduction to Mathematical Reasoning	4 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U371	Linear Algebra	4 SH

Students who fail to achieve the above conditions will be placed on departmental probation. Students who remain two consecutive semesters on departmental probation will be dismissed from the major.

**BA in Mathematics****NU CORE REQUIREMENTS**

See page 42 for requirement list.

**COLLEGE REQUIREMENTS FOR BA**

See page 69 for requirement list.

**MATHEMATICS MAJOR REQUIREMENTS FOR BA*****Problem Solving***

Complete the following course:

MTH U165	Introduction to Mathematical Reasoning	4 SH
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***History of Mathematics***

Complete the following course:

MTH U201	History of Mathematics	4 SH
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***Calculus***

Complete the following three courses:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH

***Intermediate and Advanced Mathematics***

Complete the following four courses:

MTH U371	Linear Algebra	4 SH
MTH U550	Real Analysis	4 SH
MTH U560	Geometry	4 SH
or MTH U430	Number Theory	4 SH
MTH U575	Group Theory	4 SH
or MTH U565	Topology	4 SH

***Co-op Reflections***

Complete one of the following courses:

MTH U300	Co-op Reflections Seminar 1	1 SH
MTH U400	Co-op Reflections Seminar 2	1 SH

***Mathematics Electives***

Complete two electives from the following list:

MTH U401 to MTH U799

***Required Physics***

Complete the following two courses with corresponding labs:

PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH
or PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U165	Physics 2	4 SH
with PHY U166	Lab for PHY U165	1 SH
or PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH

**MATHEMATICS MAJOR GRADE REQUIREMENT**

A grade of C or higher is required in all mathematics courses at level 399 and lower.

**MATHEMATICS MAJOR CREDIT REQUIREMENT**

Complete 54 semester hours in the major.

**UPPER-DIVISION ELECTIVES**

Complete three general electives at 300-level or above.

**GENERAL ELECTIVES**

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

**COOPERATIVE EDUCATION**

If elected

**UNIVERSITY-WIDE REQUIREMENTS**

128 total semester hours required

Minimum 2.000 GPA required

**BS in Mathematics****NU CORE REQUIREMENTS**

See page 42 for requirement list.

**MATHEMATICS MAJOR REQUIREMENTS FOR BS*****Problem Solving***

Complete the following course:

MTH U165	Introduction to Mathematical Reasoning	4 SH
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***Calculus***

Complete the following three courses with a grade of C or higher:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH

***Intermediate and Advanced Mathematics***

Complete the following five courses:

MTH U345	Ordinary Differential Equations	4 SH
MTH U371	Linear Algebra	4 SH
MTH U481	Probability and Statistics	4 SH
MTH U550	Real Analysis	4 SH
MTH U575	Group Theory	4 SH

***Co-op Reflections***

Complete one of the following courses:

MTH U300	Co-op Reflections Seminar 1	1 SH
MTH U400	Co-op Reflections Seminar 2	1 SH

***Mathematics Electives***

Complete five electives from the following list:

MTH U401 to MTH U799

***Required Physics***

Complete the following two courses with corresponding labs:

PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH
or PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH

PHY U165	Physics 2	4 SH
with PHY U166	Lab for PHY U165	1 SH
or PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH

**MATHEMATICS MAJOR GRADE REQUIREMENT**

A grade of C or higher is required in all mathematics courses at level 399 and lower.

**MATHEMATICS MAJOR CREDIT REQUIREMENT**

Complete 66 semester hours in the major.

**UPPER-DIVISION ELECTIVES**

Complete three general electives at 300-level or above.

**GENERAL ELECTIVES**

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

**COOPERATIVE EDUCATION**

If elected

**UNIVERSITY-WIDE REQUIREMENTS**

128 total semester hours required

Minimum 2.000 GPA required

**BS in Mathematics and Physics****NU CORE REQUIREMENTS**

See page 42 for requirement list.

**MATHEMATICS REQUIREMENTS****Calculus**

Complete the following three courses with a grade of C or higher:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH

**Intermediate and Advanced Mathematics**

Complete the following five courses:

MTH U345	Ordinary Differential Equations	4 SH
MTH U371	Linear Algebra	4 SH
MTH U481	Probability and Statistics	4 SH
MTH U550	Real Analysis	4 SH
MTH U575	Group Theory	4 SH

**Co-op Reflections**

Complete one of the following courses:

MTH U300	Co-op Reflections Seminar 1	1 SH
MTH U400	Co-op Reflections Seminar 2	1 SH

**Mathematics Electives**

Complete one mathematics course in the following range:

MTH U401 to MTH U799

**PHYSICS REQUIREMENTS****Physics 1**

Complete one of the following courses with corresponding lab:

PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH

**Physics 2**

Complete one of the following courses with corresponding lab:

PHY U165	Physics 2	4 SH
with PHY U166	Lab for PHY U165	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH

**Intermediate Physics**

Complete the following three courses:

PHY U303	Modern Physics	4 SH
PHY U305	Thermodynamics and Statistical Mechanics	4 SH
PHY U371	Electronics	4 SH

**Advanced Physics**

Complete the following two courses:

PHY U600	Advanced Physics Laboratory 1	4 SH
PHY U602	Electricity and Magnetism	4 SH

**Elective Courses**

Complete two physics courses in the following range:

PHY U400 to PHY U799

**INTEGRATIVE COURSES**

Complete the following two courses:

MTH U545	Fourier Series and PDEs	4 SH
or MTH U525	Applied Analysis	4 SH
PHY U601	Classical Dynamics	4 SH

**MATHEMATICS AND PHYSICS DUAL-MAJOR CREDIT REQUIREMENT**

Complete 83 semester hours in the major.

**GENERAL ELECTIVES**

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

**COOPERATIVE EDUCATION**

If elected

**UNIVERSITY-WIDE REQUIREMENTS**

128 total semester hours required

Minimum 2.000 GPA required

**BS in Computer Science and Mathematics**

See page 275.

**BS in Environmental Geology and Mathematics**

For degree requirements, please visit the myNEU Web Portal ([www.myneu.neu.edu](http://www.myneu.neu.edu)), click on the "Self-Service" tab, then on "My Degree Audit."

## BS in Geology and Mathematics

For degree requirements, please visit the myNEU Web Portal ([www.myneu.neu.edu](http://www.myneu.neu.edu)), click on the “Self-Service” tab, then on “My Degree Audit.”

### Minor in Mathematics

#### REQUIRED COURSES

Complete the following two courses:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH

Biology majors may substitute the following two courses:

MTH U151	Calculus and Differential Equations for Biology 1	4 SH
with MTH U152	Calculus and Differential Equations for Biology 2	4 SH

#### INTERMEDIATE-LEVEL COURSES

Complete two courses from the following list. Students may not take both MTH U343 and MTH U345 to satisfy this requirement:

MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
or MTH U345	Ordinary Differential Equations	4 SH
MTH U371	Linear Algebra	4 SH

#### MATHEMATICS ELECTIVES

Complete two courses in the following range:

MTH U401 TO MTH U699

#### GPA REQUIREMENT

2.000 GPA required in the minor