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):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1365</td>
<td>Introduction to Mathematical Reasoning</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 1342</td>
<td>Calculus 2 for Science and Engineering</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 2321</td>
<td>Calculus 3 for Science and Engineering</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 2331</td>
<td>Linear Algebra</td>
<td>4 SH</td>
</tr>
</tbody>
</table>

Acceptance in the major is 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:

<table>
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<td>4 SH</td>
</tr>
<tr>
<td>MATH 2331</td>
<td>Linear Algebra</td>
<td>4 SH</td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Introduction to Mathematical Reasoning</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td>4 SH</td>
</tr>
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</tr>
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<td>MATH 2321</td>
<td>Calculus 3 for Science and Engineering</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 2331</td>
<td>Linear Algebra</td>
<td>4 SH</td>
</tr>
</tbody>
</table>

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 26 for requirement list.
COLLEGE REQUIREMENTS FOR BA
See page 41 for requirement list.

MATHEMATICS MAJOR REQUIREMENTS FOR BA

Problem Solving
Complete the following course:
MATH 1365 Introduction to Mathematical Reasoning 4 SH

History of Mathematics
Complete the following course:
MATH 2201 History of Mathematics 4 SH

Calculus
Complete the following three courses:
MATH 1341 Calculus 1 for Science and Engineering 4 SH
MATH 1342 Calculus 2 for Science and Engineering 4 SH
MATH 2321 Calculus 3 for Science and Engineering 4 SH

Intermediate and Advanced Mathematics
Complete the following four courses:
MATH 2331 Linear Algebra 4 SH
MATH 3150 Real Analysis 4 SH
or MATH 4565 Topology 4 SH
MATH 3175 Group Theory 4 SH
MATH 3560 Geometry 4 SH
or MATH 3527 Number Theory 4 SH

Co-op Reflections
Complete one of the following courses:
MATH 3000 Co-op and Experiential Learning Reflection Seminar 1 1 SH
MATH 4000 Co-op and Experiential Learning Reflection Seminar 2 1 SH

Mathematics Electives
Complete two electives in the following range:
MATH 3001 to MATH 4899

Required Physics
Complete the following two courses with corresponding labs:
PHYSICS 1
PHYS 1161 Physics 1 4 SH
with PHYS 1162 Lab for PHYS 1161 1 SH
or PHYS 1151 Physics for Engineering 1 4 SH
with PHYS 1152 Lab for PHYS 1151 1 SH

PHYSICS 2
PHYS 1165 Physics 2 4 SH
with PHYS 1166 Lab for PHYS 1165 1 SH
or PHYS 1155 Physics for Engineering 2 4 SH
with PHYS 1156 Lab for PHYS 1155 1 SH

MATHEMATICS MAJOR GRADE REQUIREMENT
A grade of C or higher is required in all mathematics courses at level 3000 and lower and in MATH 4000.

EXPERIENTIAL LEARNING
Complete one course in experiential education. Please see department for approved courses.

MATHEMATICS MAJOR CREDIT REQUIREMENT
Complete 54 semester hours in the major.

UPPER-DIVISION ELECTIVES
Complete three general electives at 3000-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 26 for requirement list.

MATHEMATICS MAJOR REQUIREMENTS FOR BS

Problem Solving
Complete the following course:
MATH 1365 Introduction to Mathematical Reasoning 4 SH

Calculus
Complete the following three courses with a grade of C or higher:
MATH 1341 Calculus 1 for Science and Engineering 4 SH
MATH 1342 Calculus 2 for Science and Engineering 4 SH
MATH 2321 Calculus 3 for Science and Engineering 4 SH

Intermediate and Advanced Mathematics
Complete the following five courses:
MATH 2331 Linear Algebra 4 SH
MATH 2351 Ordinary Differential Equations 4 SH
MATH 3081 Probability and Statistics 4 SH
MATH 3150 Real Analysis 4 SH
MATH 3175 Group Theory 4 SH

Co-op Reflections
Complete one of the following courses:
MATH 3000 Co-op and Experiential Learning Reflection Seminar 1 1 SH
MATH 4000 Co-op and Experiential Learning Reflection Seminar 2 1 SH

Mathematics Electives
Complete five electives in the following range:
MATH 3101 to MATH 4899
Required Physics
Complete the following two courses with corresponding labs:

**Physics 1**
- PHYS 1161  Physics 1  4 SH
  - with PHYS 1162  Lab for PHYS 1161  1 SH
  - or PHYS 1151  Physics for Engineering 1  4 SH
  - with PHYS 1152  Lab for PHYS 1151  1 SH

**Physics 2**
- PHYS 1165  Physics 2  4 SH
  - with PHYS 1166  Lab for PHYS 1165  1 SH
  - or PHYS 1155  Physics for Engineering 2  4 SH
  - with PHYS 1156  Lab for PHYS 1155  1 SH

MATHEMATICS MAJOR GRADE REQUIREMENT
A grade of C or higher is required in all mathematics courses at level 3000 and lower and in MATH 4000.

EXPERIENTIAL LEARNING
Complete one course in experiential education. Please see department for approved courses.

MATHEMATICS MAJOR CREDIT REQUIREMENT
Complete 66 semester hours in the major.

UPPER-DIVISION ELECTIVES
Complete three general electives at 3000-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 26 for requirement list.

MATHEMATICS REQUIREMENTS

**Calculus**
Complete the following three courses with a grade of C or higher:
- MATH 1341  Calculus 1 for Science and Engineering  4 SH
- MATH 1342  Calculus 2 for Science and Engineering  4 SH
- MATH 2321  Calculus 3 for Science and Engineering  4 SH

**Intermediate and Advanced Mathematics**
Complete the following five courses:
- MATH 2331  Linear Algebra  4 SH
- MATH 2351  Ordinary Differential Equations  4 SH
- MATH 3081  Probability and Statistics  4 SH
- MATH 3150  Real Analysis  4 SH
- MATH 3175  Group Theory  4 SH

**Physics Requirements**

**Physics 1**
Complete one of the following courses with corresponding lab:
- PHYS 1161  Physics 1  4 SH
  - with PHYS 1162  Lab for PHYS 1161  1 SH
- PHYS 1151  Physics for Engineering 1  4 SH
  - with PHYS 1152  Lab for PHYS 1151  1 SH

**Physics 2**
Complete one of the following courses with corresponding lab:
- PHYS 1165  Physics 2  4 SH
  - with PHYS 1166  Lab for PHYS 1165  1 SH
- PHYS 1155  Physics for Engineering 2  4 SH
  - with PHYS 1156  Lab for PHYS 1155  1 SH

**Intermediate Physics**
Complete the following three courses:
- PHYS 2303  Modern Physics  4 SH
- PHYS 2305  Thermodynamics and Statistical Mechanics  4 SH
- PHYS 2371  Electronics  4 SH

**Advanced Physics**
Complete the following two courses:
- PHYS 3600  Advanced Physics Laboratory 1  4 SH
- PHYS 3602  Electricity and Magnetism  4 SH

**Elective Courses**
Complete two PHYS courses in the following range:
PHYS 3000 to PHYS 5999

**InTEGRATIVE COURSES**
Complete the following two courses:
- MATH 4545  Fourier Series and PDEs  4 SH
  - or MATH 4525  Applied Analysis  4 SH
- PHYS 3601  Classical Dynamics  4 SH

**EXPERIENTIAL LEARNING**
Complete one course in experiential education. Please see department for approved courses.

**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 Biology and Mathematics
See page 85.

BS in Computer Science and Mathematics
See page 290.

BS in Economics and Mathematics
For degree requirements, please visit the myNEU Web Portal (www.myneu.neu.edu), click on the “Self-Service” tab, then on “My Degree Audit.”

BS in Environmental Geology and Mathematics
For degree requirements, please visit the myNEU Web Portal (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), click on the “Self-Service” tab, then on “My Degree Audit.”

Minor in Mathematics

REQUIRED COURSES
Complete the following two courses:
MATH 1341 Calculus 1 for Science and Engineering 4 SH
MATH 1342 Calculus 2 for Science and Engineering 4 SH
Biology majors may substitute the following two courses:
MATH 1251 Calculus and Differential Equations for Biology 1 4 SH
MATH 1252 Calculus and Differential Equations for Biology 2 4 SH

INTERMEDIATE-LEVEL COURSES
Complete two courses from the following list. Students may not take both MATH 2341 and MATH 2351 to satisfy this requirement:
MATH 2321 Calculus 3 for Science and Engineering 4 SH
MATH 2331 Linear Algebra 4 SH
MATH 2341 Differential Equations and Linear Algebra for Engineering 4 SH
or MATH 2351 Ordinary Differential Equations 4 SH

MATHEMATICS ELECTIVES
Complete two courses in the following range. Note: MATH 4000 may not be used for this requirement:
MATH 3001 to MATH 4699

GPA REQUIREMENT
2.000 GPA required in the minor