The Department of Earth and Environmental Sciences’ programs are designed to help students develop an in-depth understanding of the processes that affect the earth’s surface and that have the greatest impacts on society. Graduates of such programs contribute to the solution of environmental problems such as soil or groundwater contamination, flooding, slope stability, shore erosion related to changing land use, or coping with the impact of sea-level rise or changing weather patterns related to global warming. Commonly, environmental professionals are expected to work effectively as part of a multidisciplinary team containing scientists, engineers, and professionals who can evaluate the legal, economic, political, and social ramifications of complex environmental problems. Northeastern’s emphasis on experiential, off-campus learning in addition to classroom learning is designed to help our students to become well grounded in their field of study and to work effectively with others to study and address real problems, as part of their undergraduate program.

Our Bachelor of Science in Environmental Science degree is organized for students who seek a comprehensive understanding of the scientific implications of environmental issues and the ways that environmental scientists from a range of disciplines can approach their solution. Every student has an opportunity to develop core knowledge in geology, biology, chemistry, and mathematics early in the program. Students then select one of four concentrations—surfacial processes; marine science; wildlife studies; or environmental geology—as a program focus for their upper-level course work. We also provide an Open Option for students whose interests do not fall into one of these four areas. Students who elect this option work with a faculty advisor to identify a group of five mid- to upper-level science courses that are aligned with the student’s career interests. (Students who are interested in studying environmental issues from a policy-based perspective should read the description of the environmental studies major on page 127.)

A number of dual-major programs are offered; these can help focus a student’s course choices along avenues that faculty feel are particularly appropriate.

Fieldwork is a valued component of training in our programs, and many of our courses use field sites throughout New England to demonstrate environmental processes or problems in their full complexity. In addition to sponsoring local trips, we have taken students on one longer field excursion each year to Iceland, the Cascade Mountains of Washington, the island of San Salvador in the Bahamas, or the Grand Canyon. Students also have the option to complete undergraduate research experiences with a faculty member. Undergraduate research projects can involve fieldwork and/or lab work completed under the guidance of faculty.

Many of our recent graduates work for environmental or geotechnical firms or continue their studies in graduate school. Students who participate in the co-op program typically work with local engineering or environmental consulting companies or with government agencies. These jobs often involve assessing building sites, evaluating land use, and studying problems concerned with groundwater contamination and remediation.

Transferring to the Major
Same as college standards. Acceptance into the major is based on students’ meeting the department’s criteria for admission and availability of space in the programs.

Academic Progression Standards
Same as college standards.

BS in Environmental Science

NU CORE REQUIREMENTS
See page 26 for requirement list.

ENVIRONMENTAL SCIENCE MAJOR REQUIREMENT

Geology Courses
Complete the following six courses with corresponding labs, as indicated:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVR 1101</td>
<td>Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td>ENVR 1200</td>
<td>Dynamic Earth</td>
<td>4</td>
</tr>
<tr>
<td>with ENVR 1201</td>
<td>Lab for ENVR 1200</td>
<td>1</td>
</tr>
<tr>
<td>ENVR 2340</td>
<td>Earth Landforms and Processes</td>
<td>4</td>
</tr>
<tr>
<td>with ENVR 2341</td>
<td>Lab for ENVR 2340</td>
<td>1</td>
</tr>
<tr>
<td>ENVR 3300</td>
<td>Geographic Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>with ENVR 3301</td>
<td>Lab for ENVR 3300</td>
<td>1</td>
</tr>
<tr>
<td>ENVR 4500</td>
<td>Applied Hydrogeology</td>
<td>4</td>
</tr>
<tr>
<td>with ENVR 4501</td>
<td>Lab for ENVR 4500</td>
<td>1</td>
</tr>
<tr>
<td>ENVR 5210</td>
<td>Environmental Planning</td>
<td>4</td>
</tr>
<tr>
<td>or ENVR 5250</td>
<td>Geology and Land-Use Planning</td>
<td>4</td>
</tr>
</tbody>
</table>

Calculus 1
Complete one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1241</td>
<td>Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1251</td>
<td>Calculus and Differential Equations for Biology 1</td>
<td>4</td>
</tr>
</tbody>
</table>

Calculus 2
Complete one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1242</td>
<td>Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1252</td>
<td>Calculus and Differential Equations for Biology 2</td>
<td>4</td>
</tr>
</tbody>
</table>
Biology 1
Complete one of the following courses with corresponding lab:
BIOL 1101 Principles of Biology 1 4 SH
with BIOL 1102 Lab for BIOL 1101 1 SH
BIOL 1111 General Biology 1 4 SH
with BIOL 1112 Lab for BIOL 1111 1 SH

General Chemistry 1
Complete the following course with corresponding lab:
CHEM 1211 General Chemistry 1 4 SH
with CHEM 1212 Lab for CHEM 1211 1 SH

Biology 2
Complete one of the following courses with corresponding lab:
BIOL 1103 Principles of Biology 2 4 SH
with BIOL 1104 Lab for BIOL 1103 1 SH
BIOL 1113 General Biology 2 4 SH
with BIOL 1114 Lab for BIOL 1113 1 SH

General Chemistry 2
Complete the following course with corresponding lab:
CHEM 1214 General Chemistry 2 4 SH
with CHEM 1215 Lab for CHEM 1214 1 SH

Earth and Environmental Science Capstone
Complete the following course:
ENVR 4900 Earth and Environmental Science Capstone 1 SH

ENVIRONMENTAL SCIENCE CONCENTRATIONS
Complete the required courses in one of the following concentrations, or complete the independent track in consultation with your advisor:

Concentration in Surficial Processes
ORGANIC CHEMISTRY
Complete one of the following courses with corresponding lab:
CHEM 1104 Organic Chemistry for Health Sciences 4 SH
with CHEM 1105 Lab for CHEM 1104 1 SH
CHEM 2311 Organic Chemistry 1 4 SH
with CHEM 2312 Lab for CHEM 2311 1 SH

SURFICIAL PROCESSES ELECTIVES
Complete four courses from the following list with corresponding labs, as indicated:
CIVE 2334 Environmental Engineering I 4 SH
CIVE 2340 Soil Mechanics 4 SH
ENVR 2310 Earth Materials 4 SH
with ENVR 2311 Lab for ENVR 2310 1 SH
ENVR 3302 Introduction to Remote Sensing 4 SH
with ENVR 3303 Lab for ENVR 3302 1 SH
ENVR 3400 Field Geology 4 SH
ENVR 3410 Environmental Geochemistry 4 SH
ENVR 3418 Geophysics 4 SH
ENVR 4106 Coastal Processes 4 SH
with ENVR 4107 Lab for ENVR 4106 1 SH
ENVR 4504 Environmental Pollution 4 SH
ENVR 4505 Wetlands 4 SH
ENVR 5190 Soil Science 4 SH
ENVR 5201 Geologic Field Seminar 4 SH
ENVR 5244 Sedimentation 4 SH
with ENVR 5245 Lab for ENVR 5244 1 SH
ENVR 5270 Glacial and Quaternary History 4 SH
with ENVR 5271 Lab for ENVR 5270 1 SH
ENVR 5280 Groundwater Modeling 4 SH
ENVR 5282 Groundwater Geochemistry 4 SH

Concentration in Marine Science
ORGANIC CHEMISTRY
Complete one of the following courses with corresponding lab:
CHEM 1104 Organic Chemistry for Health Sciences 4 SH
with CHEM 1105 Lab for CHEM 1104 1 SH
CHEM 2311 Organic Chemistry 1 4 SH
with CHEM 2312 Lab for CHEM 2311 1 SH

MARINE SCIENCE ELECTIVES
Complete either one semester of the Three Seas Marine Biology Program or the three marine science courses with corresponding labs, as indicated:

THREE SEAS PROGRAM
Biol 5501 Marine Botany 4 SH
with BIOL 5502 Lab for BIOL 5501 1 SH
BIOL 5503 Marine Invertebrate Zoology 4 SH
with BIOL 5504 Lab for BIOL 5503 1 SH
BIOL 5505 Biology of Corals 3 SH
BIOL 5507 Biology and Ecology of Fishes 3 SH
BIOL 5509 Marine Birds and Mammals 2 SH
with BIOL 5510 Lab for BIOL 5509 1 SH
BIOL 5513 Tropical Terrestrial Ecology 1 SH
BIOL 5515 Marine Ecology 4 SH
BIOL 5517 Oceanography 2 SH
with BIOL 5518 Lab for BIOL 5517 1 SH
BIOL 5519 Ocean and Coastal Processes 2 SH
BIOL 5521 Experimental Design Marine Ecology 4 SH
with BIOL 5522 Lab for BIOL 5521 1 SH
BIOL 5523 Molecular Marine Biology 3 SH
BIOL 5525 Marine Microbial Ecology 2 SH
with BIOL 5526 Lab for BIOL 5525 1 SH

MARINE SCIENCE COURSES
BIOI 2301 Genetics and Molecular Biology 4 SH
with BIOL 2302 Lab for BIOL 2301 1 SH
BIOI 2311 Ecology 4 SH
with BIOL 2312 Lab for BIOL 2311 1 SH
BIOI 2315 Invertebrate Zoology 4 SH
with BIOL 2316 Lab for BIOL 2315 1 SH

Concentration in Wildlife Studies
REQUIRED COURSES
Complete the following three courses with corresponding labs:
BIOI 2301 Genetics and Molecular Biology 4 SH
with BIOL 2302 Lab for BIOL 2301 1 SH
BIOI 2311 Ecology 4 SH
with BIOL 2312 Lab for BIOL 2311 1 SH
CHEM 2311 Organic Chemistry 1 4 SH
with CHEM 2312 Lab for CHEM 2311 1 SH
or CHEM 1104 Organic Chemistry for Health Sciences 4 SH
with CHEM 1105 Lab for CHEM 1104 1 SH

WILDLIFE STUDIES ELECTIVES
Complete two courses from the following list with corresponding labs, as indicated:
BIOL 2315 Invertebrate Zoology 4 SH
with BIOL 2316 Lab for BIOL 2315 1 SH
BIOL 2317 Vertebrate Zoology 4 SH
with BIOL 2318 Lab for BIOL 2317 1 SH
BIOL 3403 Animal Behavior 4 SH
BIOL 5509 Marine Birds and Mammals 2 SH
with BIOL 5510 Lab for BIOL 5509 1 SH
BIOL 5559 Entomology 4 SH
with BIOL 5560 Lab for BIOL 5559 1 SH
BIOL 5561 Herpetology 4 SH
with BIOL 5562 Lab for BIOL 5561 1 SH
BIOL 5563 Ornithology 4 SH
with BIOL 5564 Lab for BIOL 5563 1 SH
BIOL 5565 Mammalogy 4 SH
with BIOL 5566 Lab for BIOL 5565 1 SH
BIOL 5567 Wildlife Biology 4 SH
with BIOL 5568 Lab for BIOL 5567 1 SH

Concentration in Environmental Geology

REQUIRED COURSES
Complete the following two courses with corresponding labs:
ENVR 1202 History of Earth and Life 4 SH
with ENVR 1203 Interpreting Earth History 1 SH
ENVR 2310 Earth Materials 4 SH
with ENVR 2311 Lab for ENVR 2310 1 SH

ENVIRONMENTAL GEOLOGY ELECTIVES
Complete three of the following courses with corresponding labs, as indicated:
ENVR 3000 Igneous Petrology and Volcanology 4 SH
with ENVR 3001 Lab for ENVR 3000 1 SH
ENVR 3302 Introduction to Remote Sensing 4 SH
with ENVR 3303 Lab for ENVR 3302 1 SH
ENVR 3400 Field Geology 4 SH
ENVR 3410 Environmental Geochemistry 4 SH
ENVR 3418 Geophysics 4 SH
ENVR 4106 Coastal Processes 4 SH
with ENVR 4107 Lab for ENVR 4106 1 SH
ENVR 5190 Soil Science 4 SH
ENVR 5201 Geologic Field Seminar 4 SH
ENVR 5230 Structural Geology 4 SH
with ENVR 5231 Lab for ENVR 5230 1 SH
ENVR 5240 Sedimentary Basin Analysis 4 SH
with ENVR 5241 Lab for ENVR 5240 1 SH
ENVR 5242 Ancient Marine Life 4 SH
with ENVR 5243 Lab for ENVR 5242 1 SH
ENVR 5244 Sedimentation 4 SH
with ENVR 5245 Lab for ENVR 5244 1 SH
ENVR 5270 Glacial and Quaternary History 4 SH
with ENVR 5271 Lab for ENVR 5270 1 SH
ENVR 5290 Engineering Geology 4 SH

Independent Track
ENVIRONMENTAL SCIENCE COURSES
Complete a suite of at least five courses that have been approved by your advisor.

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

ENVIRONMENTAL SCIENCE MAJOR CREDIT REQUIREMENT
Complete 77 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 Environmental Geology
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 Biology and Geology
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 Chemistry
For degree requirements, please visit the myNEU Web Portal (www.myneu.neu.edu), click on the “Self-Service” tab, then on “My Degree Audit.”

BA in Environmental Geology and Environmental Studies
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 Environmental Geology and Physics
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 Chemistry
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.”

BS in Computer Science and Environmental Science
See page 286.

BS in Information Science and Environmental Science
See page 295.

Minor in Environmental Science

COURSE WORK

Introductory Course Work
Complete one of the following courses or course/lab combinations:

- **BIOL 1121** Basic Microbiology 4 SH
  - with **BIOL 1122** Lab for BIOL 1121 1 SH
- **ENVR 1101** Environmental Science 4 SH

Science or Engineering
Complete one of the following courses or course/lab combinations based on your major:

ENGINEERING MAJORS
- **CHEM 1214** General Chemistry 2 4 SH
  - with **CHEM 1215** Lab for CHEM 1214 1 SH

OTHER MAJORS
- **CHEM 2311** Organic Chemistry 1 4 SH
  - with **CHEM 2312** Lab for CHEM 2311 1 SH
- **CHEM 2321** Analytical Chemistry 4 SH
  - with **CHEM 2322** Lab for CHEM 2321 1 SH
- **CIVE 2334** Environmental Engineering 1 4 SH

Social Sciences
Complete one of the following courses:

- **ECON 3423** Environmental Economics 4 SH
- **PHIL 1180** Environmental Ethics 4 SH
- **POLS 2395** Environmental Politics 4 SH
- **SOCL 1246** Environment and Sociology 4 SH
- **SOCL 3485** Environment, Technology, and Society 4 SH

ELECTIVES
Complete any two courses or course/lab combinations from the following list. Only one course or course/lab combination may be selected from a group:

**Physics Group**
For nonengineering/nonscience majors only:
- **PHYS 1132** Energy, Environment, and Society 4 SH

**Biology Group**
- **BIOL 2311** Ecology 4 SH
- **BIOL 2317** Vertebrate Zoology 4 SH
- **BIOL 5559** Entomology 4 SH
- **BIOL 5561** Herpetology 4 SH
- **BIOL 5563** Ornithology 4 SH
- **BIOL 5565** Mammalogy 4 SH
- **BIOL 5567** Wildlife Biology 4 SH

**Environmental Planning Group**
- **ENVR 5210** Environmental Planning 4 SH
- **ENVR 5250** Geology and Land-Use Planning 4 SH

**Geology Group**
- **ENVR 2340** Earth Landforms and Processes 4 SH
  - with **ENVR 2341** Lab for ENVR 2340 1 SH
- **ENVR 4504** Environmental Pollution 4 SH
- **ENVR 5190** Soil Science 4 SH

**Hydrogeology Group**
- **ENVR 4500** Applied Hydrogeology 4 SH
  - with **ENVR 4501** Lab for ENVR 4500 1 SH
- **ENVR 5280** Groundwater Modeling 4 SH
- **ENVR 5282** Groundwater Geochemistry 4 SH

**Geographic Information Systems Group**
- **ENVR 3300** Geographic Information Systems 4 SH
  - with **ENVR 3301** Lab for ENVR 3300 1 SH

**Civil Engineering Group**
- **CIVE 4534** Environmental Engineering 2 3 SH
- **CIVE 4536** Hydrologic Engineering 4 SH

**INTERDISCIPLINARY WORK**
Complete the independent project, the applied experience, or the environmental safety program.

**Independent Project**
See program advisor for approval before embarking on the project.

**Applied Experience**
See program advisor for details.
Environmental Safety Program
See program advisor for details.

GPA REQUIREMENT
2.000 GPA required in the minor

Minor in Geology

REQUIRED COURSES
Complete the following four courses with corresponding labs:

- ENVR 1200 Dynamic Earth 4 SH
- ENVR 1202 History of Earth and Life 4 SH
- ENVR 2310 Earth Materials 4 SH
- ENVR 3000 Igneous Petrology and Volcanology 4 SH

GEOLOGY ELECTIVE
Complete one ENVR course.

GPA REQUIREMENT
2.000 GPA required in the minor

Minor in Environmental Geology

REQUIRED COURSES
Complete the following four courses with corresponding labs:

- ENVR 1200 Dynamic Earth 4 SH
- ENVR 1202 History of Earth and Life 4 SH
- ENVR 2310 Earth Materials 4 SH
- ENVR 5210 Environmental Planning 4 SH
  or ENVR 5250 Geology and Land-Use Planning 4 SH

GEOLOGY ELECTIVE
Complete one ENVR course.

GPA REQUIREMENT
2.000 GPA required in the minor