ENVIRONMENTAL SCIENCES MAJOR: HYDROLOGY OPTION (B.S.)

https://ceps.unh.edu/earth-sciences/program/bs/environmental-sciences-major-hydrology-option

**Description**

The College of Engineering and Physical Sciences (CEPS) and the College of Life Science and Agriculture (COLSA) jointly offer a bachelor of science degree in environmental sciences. Environmental sciences, an interdisciplinary field, focuses on the interaction of biological, chemical, and physical processes that shape our natural environment. Students graduating with a degree in environmental sciences will have an understanding of these interacting processes, the ability to communicate effectively with both scientific and lay audiences, competency in field methods appropriate for entry-level environmental science positions, competency in the use and application of Geographic Information Systems (GIS), a basic understanding of environmental policy, and the ability to contribute to multidisciplinary teams. The University of New Hampshire is a recognized leader in environmental sciences research, and the environmental sciences program capitalizes on faculty expertise in this area. The full-time faculty members comprising this program have major teaching and research emphases in the areas of biogeochemical cycling, environmental chemistry, geospatial science, ecosystem science, global change, hydrology, plant ecology, soil science, and water resource management.

Employment opportunities include: environmental consulting firms, educational facilities (e.g., science centers), environmental monitoring laboratories (e.g., water treatment plants; the Environmental Protection Agency), government agencies (e.g., the U.S. Geological Survey, Bureau of Land Management, Natural Resource Conservation Service), university and government research laboratories, and nongovernment environmental organizations. The environmental sciences program also constitutes an excellent preparation for graduate programs in several areas relating to the environment. Students should consult with their adviser early if their goals include further study.

The Program has four options, and specific course requirements for the major vary by option. The geosystems and hydrology options are both managed by the Department of Earth Sciences in CEPS, and the ecosystems and soils and watersheds options are both managed by the Department of Natural Resources and the Environment in the COLSA. The hydrology option provides students with a solid grounding in fundamental hydrological principles and quantitative reasoning.

**Requirements**

In addition to the Discovery Program and University writing requirements, all students will take Introduction to Environmental Science (NR 403). Introduction to Environmental Science and Professional Perspectives in Natural Resources (NR 400 Professional Perspectives in Natural Resources), plus one other elective introductory environmental science course. Foundation courses include introductions to biology, physics, chemistry, geology, calculus, and statistics.

**INTRODUCTORY**

**Code** | **Title** | **Credits**
---|---|---
NR 400 | Professional Perspectives in Natural Resources | 1
NR 403 | Introduction to Environmental Science | 4

Select one elective introductory course from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tr>
<td>NR 504</td>
<td>Freshwater Resources</td>
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<tr>
<td>CEE 520</td>
<td>Environmental Pollution and Protection: A Global Context</td>
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<tr>
<td>ESCI 405</td>
<td>Global Environmental Change</td>
</tr>
<tr>
<td>ESCI 501</td>
<td>Introduction to Oceanography</td>
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<tr>
<td>ESCI 514</td>
<td>Introduction to Climate</td>
</tr>
<tr>
<td>GEOG 473</td>
<td>Elements of Weather</td>
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**Total Credits:** 9

**FOUNDATION**

**Code** | **Title** | **Credits**
---|---|---

**Biology**

- Biol 411 | Introductory Biology Molecular and Cellular | 4
- or Biol 412 | Introductory Biology Evolution, Biodiversity and Ecology |

**Chemistry**

- Select one of the following:
  - CHEM 403 | General Chemistry I |
  - or CHEM 404 | General Chemistry II |
  - or CHEM 405 | Chemical Principles for Engineers |

**Physics**

- PHYS 407 | General Physics I |
- PHYS 408 | General Physics II |

**Calculus**

- MATH 425 | Calculus I |
- MATH 426 | Calculus II |

**Statistics**

- MATH 644 | Statistics for Engineers and Scientists |
- or BIOL 528 | Applied Biostatistics I |

**Geology**

- Select one of the following:
  - ESCI 401 | Dynamic Earth |
  - ESCI 402 | Earth History |
  - ESCI 409 | Geology and the Environment |

**Total Credits:** 32-36

**CORE COURSES**

**Code** | **Title** | **Credits**
---|---|---
ESCI 534 | Techniques in Environmental Sciences | 3
ESCI 664 | Fate and Transport in the Environment | 4
ESCI 777 | GIS for Earth & Environmental Sciences |
- or NR 658 | Introduction to Geographic Information Systems |
NR 602 | Natural Resources and Environmental Policy |
- or NR 662 | Environmental Policy, Planning and Sustainability in New Zealand |

**Capstone Experience** ¹

**Total Credits:** 15

¹ NR 791 Preparation for Capstone and an independent study or capstone course taken in the senior year and approved by their adviser and the program coordinator.

**HYDROLOGY**

**Code** | **Title** | **Credits**
---|---|---
ESCI 561 | Landscape Evolution | 4
**Soils/Mineralogy**

- ESCI 512 | Principles of Mineralogy |
- or NR 601 | Studio Soils |
**Surface Water Hydrology**

- ESCI 765 | Principles of Hydrology |
- or CEE 754 | Engineering Hydrology |
**Groundwater Hydrology**

- ESCI 710 | Groundwater Hydrology |

**Credits:** 4
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Select one Quantitative Analysis course from the following:

- CS 410  Introduction to Scientific Programming
- ESCI 701  Quantitative Methods in Earth Sciences
- ESCI 764  Spectral Analysis of Geophysical Time Series Data
- MATH 525  Linearity I
- MATH 527  Differential Equations with Linear Algebra
- MATH 528  Multidimensional Calculus
- MATH 645  Linear Algebra for Applications
- MATH 739  Applied Regression Analysis
- MATH 740  Design of Experiments I

Select two or three approved electives from the following:

- CEE 650  Fluid Mechanics
- CEE 721  Environmental Sampling and Analysis
- CEE 723  Environmental Water Chemistry
- CEE 724  Environmental Engineering Microbiology
- CEE 750  Ecolyhology
- CEE 751  Open Channel Flow
- CEE 758  Stormwater Management Design
- CEE 759  Stream Restoration
- ESCI 642  Biogeoosciences in the Earth System
- ESCI 741  Geochemistry
- ESCI 745  Isotope Geochemistry
- ESCI 747  Aquatic Geochemistry
- ESCI 762  Glacial Geology
- ESCI 778  Remote Sensing Earth & Environmental Sciences
- NR 660  Ecology and Biogeography of New Zealand
- NR 661  Restoration Ecology and Ecosystem Management in New Zealand
- NR 703  Watershed Water Quality Management
- NR 707  Environmental Modeling
- NR 711  Wetland Ecology and Management
- NR 744  Biogeochemistry
- NR 751  Aquatic Ecosystems
- NR 757  Remote Sensing of the Environment
- NR 759  Digital Image Processing for Natural Resources
- NR 761  Environmental Soil Chemistry

Total Credits 28-32

Some students enroll in the EcoQuest program (a study abroad opportunity in New Zealand), which satisfies the policy requirement, and capstone requirement if taken senior year.

Students must complete additional courses for the hydrology option to total 88 credits in the major.

For further information about the hydrology option or to discuss alternative elective courses, students may contact earth.sciences@unh.edu. (earth.sciences@unh.edu)