ENVIRONMENTAL SCIENCES MAJOR: SOIL AND WATERSHEDS OPTION (B.S.)

https://colsa.unh.edu/natural-resources-environment/program/bs/environmental-sciences-major-soil-watersheds-option

Description

The College of Life Sciences and Agriculture (COLSA) and the College of Engineering and Physical Sciences (CEPS) jointly offer a bachelor of science degree in environmental sciences. Environmental science is an interdisciplinary field concerned with the interaction of biological, chemical, and physical processes that shape the environment, and control the response of natural systems to human activities. Students graduating with a degree in environmental sciences will have an understanding of these interacting processes, experience working in interdisciplinary teams to apply this understanding, and the ability to communicate effectively with both scientific and lay audiences. While in this program, students will acquire significant experience with field, laboratory and analytical methods appropriate for employment in professional environmental science positions as well as a basic understanding of environmental policy. 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. Program faculty emphasize teaching and research in the areas of biogeochemical cycling, environmental chemistry, ecosystem science, global change, hydrology, plant ecology, soil science, and water resource management among many other fields.

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.

The Program has four options, and specific course requirements for the major vary by option. The ecosystems and soils and watersheds options are both managed by the Department of Natural Resources and the Environment in COLSA, and the geosystems and hydrology options are both managed by Earth Sciences in CEPS.

Requirements

Degree Requirements

Minimum Credit Requirement: 128 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.

*Major GPA requirements as indicated.

Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NR 400</td>
<td>Professional Perspectives in Natural Resources</td>
<td>1</td>
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<tr>
<td>NR 403</td>
<td>Introduction to Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td>NR 435</td>
<td>Contemporary Conservation Issues and Environmental Awareness</td>
<td>4</td>
</tr>
<tr>
<td>or NR 437</td>
<td>Principles of Sustainability</td>
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<tr>
<td>NR 541</td>
<td>Introductory Biology Molecular and Cellular</td>
<td>4</td>
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<tr>
<td>BIOL 412</td>
<td>Introductory Biology Evolution, Biodiversity and Ecology</td>
<td>4</td>
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<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>or CHEM 405</td>
<td>Chemical Principles for Engineers</td>
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<tr>
<td>or CHEM 411</td>
<td>Introductory Chemistry for Life Sciences</td>
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<tr>
<td>NR 561</td>
<td>Chemistry of the Environment</td>
<td>4</td>
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<tr>
<td>or CHEM 404</td>
<td>General Chemistry II</td>
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<tr>
<td>PHYS 401</td>
<td>Introduction to Physics I</td>
<td>4</td>
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<tr>
<td>or PHYS 407</td>
<td>General Physics I</td>
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<tr>
<td>BIOL 411</td>
<td>Introductory Biology Molecular and Cellular</td>
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<tr>
<td>or PHYS 402</td>
<td>Introduction to Physics II</td>
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</tr>
<tr>
<td>or PHYS 408</td>
<td>General Physics II</td>
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<tr>
<td>MATH 4248</td>
<td>Calculus for Life Sciences</td>
<td>4</td>
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<tr>
<td>or MATH 425</td>
<td>Calculus I</td>
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<tr>
<td>BIOL 528</td>
<td>Applied Biostatistics I</td>
<td>4</td>
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<tr>
<td>or EREC 525</td>
<td>Statistical Methods and Applications</td>
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<tr>
<td>ESCI 401</td>
<td>Dynamic Earth</td>
<td>4</td>
</tr>
<tr>
<td>or ESCI 402</td>
<td>Earth History</td>
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<tr>
<td>or ESCI 409</td>
<td>Geology and the Environment</td>
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<tr>
<td>NR 504</td>
<td>Freshwater Resources</td>
<td>4</td>
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<tr>
<td>NR 501</td>
<td>Studio Soils</td>
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<tr>
<td>ESCI 614</td>
<td>Introduction to Climate</td>
<td>3-4</td>
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<tr>
<td>or GEOG 473</td>
<td>Elements of Weather</td>
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<tr>
<td>or GEOG 670</td>
<td>Climate and Society</td>
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<tr>
<td>BIOL 541W</td>
<td>Ecology</td>
<td>4-6</td>
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<tr>
<td>or NR 660</td>
<td>Ecology and Biogeography of New Zealand</td>
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<tr>
<td>or NR 527</td>
<td>Forest Ecology</td>
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<tr>
<td>or MEFB 530</td>
<td>Evolution and Marine Diversity</td>
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<tr>
<td>or MEFB 674</td>
<td>Ecology and Marine Environment</td>
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<tr>
<td>NR 602</td>
<td>Natural Resources and Environmental Policy</td>
<td>4</td>
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<tr>
<td>or NR 662</td>
<td>Environmental Policy, Planning and Sustainability in New Zealand</td>
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<tr>
<td>or NR 507</td>
<td>Introduction to our Energy System and Sustainable Energy</td>
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<tr>
<td>or NR 784</td>
<td>Sustainable Living - Global Perspectives</td>
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<tr>
<td>or MEFB 702</td>
<td>Sustainable Marine Fisheries</td>
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<tr>
<td>ESCI 534</td>
<td>Techniques in Environmental Sciences</td>
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<tr>
<td>NR 668</td>
<td>Introduction to Geographic Information Systems</td>
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<tr>
<td>or ESCI 777</td>
<td>GIS for Earth &amp; Environmental Sciences</td>
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<tr>
<td>or FORT 581</td>
<td>Applied Geospatial Techniques</td>
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<tr>
<td>NR 757</td>
<td>Remote Sensing of the Environment</td>
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<tr>
<td>or ESCI 778</td>
<td>Remote Sensing Earth &amp; Environmental Sciences</td>
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<tr>
<td>NR 707</td>
<td>Environmental Modeling</td>
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Environmental Toolkit (Methods - 2 Courses)

Select two courses from the following:

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<tr>
<td>ESCI 534</td>
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Environmental Sciences Major: Soil and Watersheds Option (B.S.)

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<tr>
<th>Course Code</th>
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<td>NR 713</td>
<td>Quantitative Ecology</td>
<td></td>
</tr>
<tr>
<td>MEFB 500</td>
<td>Coastal Habitat Field Research Methods</td>
<td></td>
</tr>
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**Soil and Watershed Systems (Advanced Topics – 5 courses)**

**Advanced Soils:**
- NR 761 Environmental Soil Chemistry 4
- or NR 706 Soil Ecology 4

**Watersheds:**
- NR 703 Watershed Water Quality Management 4

**Ecosystems:**
- NR 730 Terrestrial Ecosystems 4
- or NR 751 Aquatic Ecosystems 4
- or NR 661 Restoration Ecology and Ecosystem Management in New Zealand 4
- or MEFB 508 Marine Ecosystem Research and Management 4

**Biogeochemistry:**
- NR 744 Biogeochemistry 4
- or ESCI 642 Biogeoosciences in the Earth System 4

**Advanced Soils and Watersheds:**
- NR 743 Addressing Arctic Challenges 1 4
- or ESCI 654 Fate and Transport in the Environment 4
- or ESCI 705 Principles of Hydrology 4
- or ESCI 710 Groundwater Hydrology 4
- or ESCI 747 Aquatic Geochemistry 4
- or CEE 796 Special Topics 4
- or CEE 754 Engineering Hydrology 4

**Integration and Research (The Capstone Experience)**

**Capstone:**
- NR 663 Applied Directed Research in New Zealand 4
- or NR 786 Leadership for Sustainability 4
- or NR 795 Investigations 4
- or NR 799 Honors Senior Thesis 4

OR approved research experience, or approved internship. Every student must complete a capstone experience senior year or during the summer before senior year if at least 90 credit hours have been completed.

- NR #791 – Preparation for Capstone (1 credit, pass/no credit) is offered every spring. While not required for graduation, it is recommended for second semester juniors who need guidance in terms of developing a capstone project and completing the Capstone Contract.
  - a. A Contract form provided by the Program must be completed and signed by the student, the advisor, the program coordinator, and the capstone mentor (faculty or off-campus) before the capstone experience by the end of Junior Year.
  - b. A signed Capstone Experience Evaluation form must be handed in to your advisor by the end of Senior year in order to graduate.

**Individualization Your Education (19 Credits)**

Program Advisors will help students select additional courses from across the campus that relate to that student’s areas of intellectual interest, and assist with the completion of minors, dual majors, study abroad programs, research projects, internships, etc. 19

**Total Credits** 110-113

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1. NR 706 Soil Ecology or NR 761 Environmental Soil Chemistry if not already taken.
2. Many 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.
3. NR 791 Preparation for Capstone is offered every spring. While not required for graduation, it is recommended for second semester juniors who need guidance in terms of developing a capstone project and completing the Capstone Contract.

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**Student Learning Outcomes**

Key Learning Objectives: The primary Learning Outcome for the Environmental Science Program will be that students will master the content offered in the courses specified in the curriculum as assessed by performance on exams, labs and written assignments. This will include an understanding of the physical, chemical and biological processes central to the function of environmental systems, the mathematical concepts required to understand, explain and predict those processes, and the ability to determine the significance of results, both in terms of statistical probability and impact on the larger world.

The learning process leading to this mastery will require that students will have:

- Knowledge of how physical, chemical, and biological factors interact with human activities to shape the environment;
- Proficiency with environmental techniques including field, lab, GIS, or modeling;
- The ability to solve environmental problems;
- The ability to communicate orally or in writing about environmental dynamics.