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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Scope of the Major (Introduction - 3 Courses)</td>
<td>9</td>
<td></td>
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<tr>
<td>NR 400</td>
<td>Professional Perspectives in Natural Resources</td>
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<tr>
<td>NR 403</td>
<td>Introduction to Environmental Science</td>
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<td>NR 435</td>
<td>Contemporary Conservation Issues and Environmental Awareness</td>
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<td>or NR 437</td>
<td>Principles of Sustainability</td>
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<tr>
<td>The Scientific Basis (Foundation - 7 Courses)</td>
<td>28</td>
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<tr>
<td>Biology I</td>
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<tr>
<td>BIOL 412</td>
<td>Introductory Biology: Evolution, Biodiversity and Ecology</td>
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<tr>
<td>Biology II</td>
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<tr>
<td>BIOL 411</td>
<td>Introductory Biology: Molecular and Cellular</td>
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Chemistry I:
- CHEM 403 General Chemistry I
- or CHEM 405 Chemical Principles for Engineers
- or CHEM 413 Introductory Chemistry for Life Sciences

Chemistry II:
- NR 561 Chemistry of the Environment
- or CHEM 404 General Chemistry II

Physics:
- PHYS 401 Introduction to Physics I
- or PHYS 407 General Physics I

Calculus:
- MATH 424B Calculus for Life Sciences
- or MATH 425 Calculus I

Statistics:
- BIOC 528 Applied Biostatistics I
- or EREC 525 Statistical Methods and Applications

Earth and its Systems (Core - 6 Courses) | 24
- ESCI 401 Dynamic Earth
- or ESCI 402 Earth History
- or ESCI 409 Geology and the Environment

Aquatic Science:
- NR 504 Freshwater Resources

Soils:
- NR 561 Studio Soils

Climate/Weather:
- ESCI 514 Introduction to Climate
- or GEOG 473 Elements of Weather
- or GEOG 670 Climate and Society

Ecology:
- NR 527 Forest Ecology
- or NR 660 Ecology and Biogeography of New Zealand
- or BIOL 541 Ecology

Human Dimensions:
- NR 602 Natural Resources and Environmental Policy
- or NR 662 Environmental Policy, Planning and Sustainability in New Zealand
- or NR 507 Introduction to our Energy System and Sustainable Energy
- or NR 784 Sustainable Living - Global Perspectives

Environmental Toolkit (Methods - 2 Courses) | 7-8
- Select two courses from the following:
  - ESCI 534 Techniques in Environmental Sciences
  - NR 658 Introduction to Geographic Information Systems
  - or ESCI 777 GIS for Earth & Environmental Sciences
  - or FORT 581 Applied Geospatial Techniques
  - NR 757 Remote Sensing of the Environment
  - or ESCI 778 Remote Sensing Earth & Environmental Sciences

Ecosystem Integration (Advanced Topics - 4 Courses) | 16
- Population and Community Ecology
  - NR 765 Community Ecology
  - or NR 734 Tropical Ecology
  - or NR 706 Soil Ecology
  - or NR 660 Ecology and Biogeography of New Zealand
  - or NR 640 Wildlife Population Ecology
  - or NR 642 Introduction to Biogeography
  - or NR 603 Landscape Ecology
  - or BIOL 720 Plant-Animal Interactions

Ecosystems:
- NR 730 Terrestrial Ecosystems
- or NR 731 Aquatic Ecosystems
- or NR 661 Restoration Ecology and Ecosystem Management in New Zealand

Biogeochemistry:
- NR 744 Biogeochemistry
- or NR 761 Environmental Soil Chemistry
- or NR 703 Watershed Water Quality Management
- or ESCI 642 Biogeochemiscies in the Earth System

Environmental Problem Solving:
Environmental Sciences Major: Ecosystems Option (B.S.)

ESCI 654 Fate and Transport in the Environment
or NR 707 Environmental Modeling
or EREC 760 Ecological-Economic Modeling for Decision Making
or NR 749 Forest Inventory and Modeling
or NR 743 Ecology and Society in a Changing Arctic

Integration and Research (The Capstone Experience) 1-2

Capstone:

NR 663 Applied Directed Research in New Zealand
or NR 786 Leadership for Sustainability
or NR 795 Investigations
or NR 799 Honors Senior Thesis

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 adviser, 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.

Individualizing Your Education (Electives)

One goal of this program is to allow students the opportunity to pursue minors, dual majors, research and study abroad opportunities, while still completing the degree in four years of full-time enrollment. To this end, the program requires a total of 85 credit hours. The University Discovery program includes 5 areas (20 credit hours) not covered by this major. These include English 401, Fine and Performing Arts, Humanities, Historical Perspectives, World Cultures (NOTE: The World Cultures category can be met by certain study abroad programs, including EcoQuest). Combined, Major and Discovery requirements total 105 credit hours. With a total of 128 credit hours required by the University for graduation, this leaves 23 credit hours that can be put towards minors, dual majors, study abroad, Directed Research, etc.

Total Credits: 84-85

1 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.

2 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.

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 can:

• Evaluate the quality of information sources and the validity of scientific theories and data presented in those sources
• Describe and explain the interactions among physical, biological, chemical, and human components of the environment, especially in terms of feedbacks embedded in environmental system that often control their trajectory
• Formulate tests of environmental questions, acquire data, and apply scientific methods to answer these questions;
• Establish protocols for collecting, transcribing, storing and analyzing data collected during field, laboratory or modeling experiments

Master mathematical, statistical, and study design knowledge and skills, and use state-of-the-art software, hardware, and analytical techniques relevant to environmental conservation and sustainability.

• Communicate effectively to peers within the environmental community and with audiences outside of the discipline.