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 related 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>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of the Major (Introduction - 3 Courses)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>NR 400</td>
<td>Professional Perspectives in Natural Resources</td>
<td></td>
</tr>
<tr>
<td>NR 403</td>
<td>Introduction to Environmental Science</td>
<td></td>
</tr>
<tr>
<td>NR 435</td>
<td>Contemporary Conservation Issues and Environmental Awareness</td>
<td></td>
</tr>
<tr>
<td>or NR 437</td>
<td>Principles of Sustainability</td>
<td></td>
</tr>
<tr>
<td>The Scientific Basis (Foundation - 7 Courses)</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Biology I</td>
<td>BIOL 412 Introductory Biology: Evolution, Biodiversity and Ecology</td>
<td></td>
</tr>
<tr>
<td>Chemistry I</td>
<td>CHEM 403 General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>Earth Science</td>
<td>ESCI 534 Techniques in Environmental Sciences</td>
<td></td>
</tr>
<tr>
<td>Earth and its Systems (Core - 6 Courses)</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Earth Science</td>
<td>ESCI 401 Dynamic Earth</td>
<td></td>
</tr>
<tr>
<td>or ESCI 402</td>
<td>Earth History</td>
<td></td>
</tr>
<tr>
<td>or ESCI 409</td>
<td>Geology and the Environment</td>
<td></td>
</tr>
<tr>
<td>Aquatic Science</td>
<td>NR 504 Freshwater Resources</td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>NR 501 Studio Soils</td>
<td></td>
</tr>
<tr>
<td>Climate/Weather</td>
<td>ESCI 514 Introduction to Climate</td>
<td></td>
</tr>
<tr>
<td>or GEOG 473</td>
<td>Elements of Weather</td>
<td></td>
</tr>
<tr>
<td>or GEOG 670</td>
<td>Climate and Society</td>
<td></td>
</tr>
<tr>
<td>Ecology</td>
<td>ESCI 481 Ecology</td>
<td></td>
</tr>
<tr>
<td>or NR 660</td>
<td>Ecology and Biogeography of New Zealand</td>
<td></td>
</tr>
<tr>
<td>or NR 527</td>
<td>Forest Ecology</td>
<td></td>
</tr>
<tr>
<td>Human Dimensions</td>
<td>NR 602 Natural Resources and Environmental Policy</td>
<td></td>
</tr>
<tr>
<td>or NR 662</td>
<td>Environmental Policy, Planning and Sustainability in New Zealand</td>
<td></td>
</tr>
<tr>
<td>or NR 507</td>
<td>Introduction to our Energy System and Sustainable Energy</td>
<td></td>
</tr>
<tr>
<td>or NR 784</td>
<td>Sustainable Living - Global Perspectives</td>
<td></td>
</tr>
<tr>
<td>Environmental Toolkit (Methods - 2 Courses)</td>
<td>7-8</td>
<td></td>
</tr>
<tr>
<td>Select two courses from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESCI 534</td>
<td>Techniques in Environmental Sciences</td>
<td></td>
</tr>
<tr>
<td>NR 668</td>
<td>Introduction to Geographic Information Systems</td>
<td></td>
</tr>
<tr>
<td>or ESCI 777</td>
<td>GIS for Earth &amp; Environmental Sciences</td>
<td></td>
</tr>
<tr>
<td>or FORT 581</td>
<td>Applied Geospatial Techniques</td>
<td></td>
</tr>
<tr>
<td>NR 757</td>
<td>Remote Sensing of the Environment</td>
<td></td>
</tr>
<tr>
<td>or ESCI 778</td>
<td>Remote Sensing Earth &amp; Environmental Sciences</td>
<td></td>
</tr>
<tr>
<td>NR 707</td>
<td>Environmental Modeling</td>
<td></td>
</tr>
<tr>
<td>NR 713</td>
<td>Quantitative Ecology</td>
<td></td>
</tr>
<tr>
<td>Soil and Watershed Systems (Advanced Topics - 5 courses - 20 credits)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watersheds</td>
<td>NR 703 Watershed Water Quality Management</td>
<td>16</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>NR 730 Terrestrial Ecosystem</td>
<td></td>
</tr>
<tr>
<td>or NR 751</td>
<td>Aquatic Ecosystem</td>
<td></td>
</tr>
<tr>
<td>or NR 661</td>
<td>Restoration Ecology and Ecosystem Management in New Zealand</td>
<td></td>
</tr>
<tr>
<td>Biogeochemistry</td>
<td>NR 744 Biogeochemistry</td>
<td></td>
</tr>
<tr>
<td>or ESCI 643</td>
<td>Biogeochemist in the Earth System</td>
<td></td>
</tr>
<tr>
<td>Advanced Soils and Watersheds</td>
<td>NR 743 Ecology and Society in a Changing Arid Climate 1</td>
<td></td>
</tr>
<tr>
<td>or ESCI 664</td>
<td>Fate and Transport in the Environment</td>
<td></td>
</tr>
<tr>
<td>or ESCI 705</td>
<td>Principles of Hydrology</td>
<td></td>
</tr>
<tr>
<td>or ESCI 718</td>
<td>Groundwater Hydrology</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Sciences Major: Soil and Watersheds Option (B.S.)

or ESCI 747  Aqueous Geochemistry  
or CEE 796  Special Topics  
or CEE 754  Engineering Hydrology

Integration and Research (The Capstone Experience)  

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course NAME</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>NR 663</td>
<td>Applied Directed Research in New Zealand</td>
</tr>
<tr>
<td>4</td>
<td>or NR 786</td>
<td>Leadership for Sustainability</td>
</tr>
<tr>
<td></td>
<td>or NR 795</td>
<td>Investigations</td>
</tr>
<tr>
<td></td>
<td>or NR 799</td>
<td>Honors Senior Thesis</td>
</tr>
</tbody>
</table>

Capstone: NR 663 (EcoQuestif Senior Year)(WI), or NR 786, or NR 795, or NR 799, 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.

NR701 – 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 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.
- 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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course NAME</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NR706 or NR761 if not already taken.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

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.