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. 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.

In the ecosystems option, students focus on understanding the interactions between living and non-living things in a variety of settings, including forests, fields, streams, wetlands, rivers, and lakes, including how ecosystems respond to human influence. The ability of ecosystems to withstand and mitigate environmental change is emphasized. Students will also gain a basic understanding of environmental policy, field methods and geographic information systems (GIS), and learn how to communicate effectively with many audiences.

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.

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

Code	Title	Credits
Scope of the Major (Introduction - 3 Courses)		
NR 400	Professional Perspectives in Natural Resources	1
NR 403	Introduction to Environmental Science	4
NR 435	Contemporary Conservation Issues and Environmental Awareness	4
or NR 437	Principles of Sustainability	
The Scientific Basis (Foundation - 7 Courses)		
Biology I		
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
Biology II		
BIOL 411	Introductory Biology: Molecular and Cellular	4
or NR 439	Environmental Biology	
Chemistry I		
CHEM 403	General Chemistry I	4
or CHEM 405	Chemical Principles for Engineers	
or CHEM 411	Introductory Chemistry for Life Sciences	
Chemistry II		
NR 561	Chemistry of the Environment	4
or CHEM 404	General Chemistry II	
Physics		
PHYS 401	Introduction to Physics I	4
or PHYS 407	General Physics I	
Calculus		
MATH 424B	Calculus for Life Sciences	4
or MATH 425	Calculus I	
Statistics		
BIOL 528	Applied Biostatistics I	4
or NR 525	Statistical Methods and Applications	
Earth and its Systems (Core - 6 Courses)		
Earth Science		
ESCI 401	Dynamic Earth	4
or ESCI 402	Earth History	
or ESCI 409	Geology and the Environment	
Aquatic Science		
NR 504	Freshwater Resources	4
Soils		
NR 501	Studio Soils	4
Climate/Weather		
ESCI 514	Introduction to Climate	3-4
or GEOG 473	Elements of Weather	
or GEOG 670	Climate and Society	
Ecology		
NR 527	Forest Ecology	4
or NR 660	Ecology and Biogeography of New Zealand	
or BIOL 541W	Ecology	
or MEFB 530	Evolution and Marine Diversity	
or MEFB 674	Ecology and Marine Environment	
Human Dimensions		

NR 602	Natural Resources and Environmental Policy	4
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	
or MEFB 702	Sustainable Marine Fisheries	
Environmental Toolkit (Methods - 2 Courses)		
Select two courses from the following:		7-8
ESCI 534	Techniques in Environmental Sciences	
NR 658	Introduction to Geographic Information Systems	
or ESCI 777	GIS for Earth & Environmental Sciences	
NR 757	Remote Sensing of the Environment	
or ESCI 778	Remote Sensing Earth & Environmental Sciences	
NR 713	Quantitative Ecology	
Ecosystem Integration (Advanced Topics - 4 Courses)		
Select four courses from the following:		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 BIOL 720	Plant-Animal Interactions	
Ecosystems		
NR 730	Terrestrial Ecosystems	
or NR 751	Aquatic Ecosystems	
or NR 661	Restoration Ecology and Ecosystem Management in New Zealand	
or MEFB 508	Marine Ecosystem Research and Management	
Biogeochemistry		
NR 744	Biogeochemistry	
or NR 761	Environmental Soil Chemistry	
or NR 703	Watershed Water Quality Management	
or ESCI 642	Biogeosciences in the Earth System	
Environmental Problem Solving		
ESCI 654	Fate and Transport in the Environment	
or NR 707	Environmental Modeling	
or NR 749	Forest Inventory and Modeling	
or NR 743	Addressing Arctic Challenges	
or NR 731	Agriculture and Environmental Change: Challenges and Solutions	
Integration and Research (The Capstone Experience) [1]		
Capstone:		
NR 663	Applied Directed Research in New Zealand	
or NR 795	Investigations	
or NR 799	Honors Senior Thesis	
Total Credits		**83-85**

Capstone Experience

NR 663 Applied Directed Research in New Zealand (EcoQuest if Senior Year), or NR 795 Investigations, or NR 799 Honors Senior Thesis, 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.

1) 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 the junior year.

2) A signed Capstone Experience Evaluation form must be submitted to your advisor by the end of the senior year in order to graduate.

Preparation for Capstone: Please discuss with your faculty advisor regularly what kind of capstone experience you would like to pursue. If you remain uncertain during the junior year, the Earth Science department offers a Capstone Preparation course, ESCI 796 Topics in the spring, but this is not required.

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.

[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.

Degree Plan

Sample Degree Plan

This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.

First Year		
Fall		**Credits**
NR 400	Professional Perspectives in Natural Resources	1
NR 403	Introduction to Environmental Science	4
NR 435	Contemporary Conservation Issues and Environmental Awareness	4
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
ENGL 401	First-Year Writing (or Discovery Course)	4
	Credits	**17**
Spring		
BIOL 411 or NR 439	Introductory Biology: Molecular and Cellular or Environmental Biology	4
MATH 424B	Calculus for Life Sciences	4
ESCI 401 or ESCI 402 or ESCI 409	Dynamic Earth or Earth History or Geology and the Environment	4
ENGL 401	First-Year Writing (or Discovery Course)	4
	Credits	**16**
Second Year		
Fall		
CHEM 411	Introductory Chemistry for Life Sciences	4
ESCI 534	Techniques in Environmental Sciences	3
NR 501	Studio Soils	4
Discovery Course		4
	Credits	**15**

Spring		
NR 561	Chemistry of the Environment	4
BIOL 528	Applied Biostatistics I	4
NR 504	Freshwater Resources	4
Discovery or Elective Course		4
	Credits	**16**
Third Year		
Fall		
PHYS 401	Introduction to Physics I	4
NR 527 or BIOL 541W	Forest Ecology or Ecology	4
Human Dimension Course		4
Discovery or Elective Course		4
	Credits	**16**
Spring		
Toolkit II Course		4
Populations/Community Ecology Course		4
Ecosystems Course		4
Discovery or Elective Course		4
	Credits	**16**
Fourth Year		
Fall		
Environmental Problem Solving Course		4
GEOG 473	Elements of Weather	4
Elective Course		4
Capstone		
	Credits	**12**
Spring		
Biogeochemistry Course		4
Discovery or Elective Course		4
Elective Course		4
Capstone		
	Credits	**12**
	Total Credits	**120**

Student Learning Outcomes

Program 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.