

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

<https://ceps.unh.edu/earth-sciences/environmental-sciences-hydrology-bs>

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:		4
NR 504	Freshwater Resources	
CEE 520	Environmental Pollution and Protection: A Global Context	
ESCI 405	Global Environmental Change	
ESCI 501	Introduction to Oceanography	
ESCI 514	Introduction to Climate	
GEOG 473	Elements of Weather	
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:		4-8
CHEM 403	General Chemistry I	
& CHEM 404	and General Chemistry II	
	or CHEM 405 Chemical Principles for Engineers	
Physics		
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
Calculus		
MATH 425	Calculus I	4
MATH 426	Calculus II	4
Statistics		
MATH 644	Statistics for Engineers and Scientists	
or BIOL 528	Applied Biostatistics I	
Geology		
Select one of the following:		4
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 654	Fate and Transport in the Environment	4
ESCI 777	GIS for Earth & Environmental Sciences	4
or NR 658	Introduction to Geographic Information Systems	
NR 602	Natural Resources and Environmental Policy	4
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
Geomorphology		
ESCI 561	Landscape Evolution	4
Soils/Mineralogy		
ESCI 512 or NR 501	Principles of Mineralogy Studio Soils	4
Surface Water Hydrology		
ESCI 705 or CEE 754	Principles of Hydrology Engineering Hydrology	4
Groundwater Hydrology		
ESCI 710	Groundwater Hydrology	4
Select one Quantitative Analysis course from the following:		4
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:		8-12
CEE 650	Fluid Mechanics	
CEE 721	Environmental Sampling and Analysis	
CEE 723	Environmental Water Chemistry	
CEE 724	Environmental Engineering Microbiology	
CEE 750	Ecohydrology	
CEE 751	Open Channel Flow	
CEE 758	Stormwater Management Designs	
CEE 759	Stream Restoration	
ESCI 642	Biogeosciences in the Earth System	
ESCI 741	Geochemistry	
ESCI 745	Isotope Geochemistry	
ESCI 747	Aqueous 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)