HYDROLOGY (M.S.)

https://ceps.unh.edu/earth-sciences/program/ms/hydrology

Description

This program is intended for students with an interest in ground- and surface-water hydrology, water quality, quantitative and statistical hydrology, and water resource management. Durham, where the university is located, is situated where the Oyster River enters Great Bay, one of the most important estuaries of the Gulf of Maine. Only ten miles away are the Atlantic beaches and Portsmouth, a deep water harbor.

Admission Requirements

An applicant to the M.S. program is expected to have completed one year of calculus and at least four semesters of college chemistry, physics, and/or biology; and to have an undergraduate degree or equivalent in geology, chemistry, physics, mathematics, engineering, or the biological sciences. Students lacking some background in a particular area may be admitted provided they are prepared to complete courses, without graduate credit, in which they may be deficient. The program of study a student wishes to follow and the student's undergraduate major determine the level of preparation necessary. The preparation of each student is determined before the beginning of the first semester in residence in order to plan the course of study. Each entering student is assigned an academic adviser to assist in planning a program of study.

Requirements

Degree Requirements

Students in the thesis option must satisfactorily complete at least **30 graduate credits**, which include the credits accumulated in the core curriculum. Students in this option must complete a 6 credit master's thesis (ESCI 899) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least **34 graduate credits**, which includes the core curriculum, a 2--credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

Hydrology

Code	Title	Credits
The core curriculum for the major in hydrology normally includes:		
ESCI 805	Principles of Hydrology	
ESCI 810	Groundwater Hydrology	
Required Courses:		
ESCI 997	Seminar in Earth Sciences (first year)	
ESCI 998	Proposal Development (first year)	
Select Master's Thesis or Directed Research:		
ESCI 899	Master's Thesis	
ESCI 898	Directed Research	

In each of the options listed above, additional electives are to be selected from 800- and 900--level courses in the department and/or from courses numbered 700 and above in related disciplines outside of the department (e.g., civil and environmental engineering, natural resources, chemistry, mathematics and statistics, and computer science). More detailed information is available from the department.

Degree Plan

Course	Title	Credits
First Year		
Fall		
Core Curriculum 1	Course	4
Elective 1	Course	3-4
ESCI 997	Seminar in Earth Sciences	1
	Credits	**8-9**
Spring		
Core Curriculum 2	Course	4
Elective 2	Course	3-4
ESCI 998	Proposal Development	1
	Credits	**8-9**
Second Year		
Fall		
Elective 3	Course	3-4
ESCI 899	Master's Thesis (or Elective for Directed Research Option)	3-4
	Credits	**6-8**
Spring		
Elective 4	Course	3-4
ESCI 899 or ESCI 898	Master's Thesis or Directed Research	2 or3
	Credits	**5-7**
	Total Credits	**27-33**

Student Learning Outcomes

Students graduating with a MS in Earth Sciences (Geology, Geochemical Systems, or Ocean Mapping focus) should be able to:

Core Knowledge

- Demonstrate a foundation of knowledge in Geology, Geochemical Systems, or Ocean Mapping that results in expertise in at least one of the following:

  • Solid Earth Processes: An understanding of geology, geophysics, or petrology at a range of timescales, focused on, for example, the structure of the Earth, plate tectonic reconstructions, seismology and earthquake hazards, magmatic, volcanic, or metamorphic processes, or other studies that allow for the reconstruction of geologic, geophysical, or petrologic processes at a range of spatial and time scales.

  • Earth Surface Processes: An understanding of surficial processes and their manifestations in the geologic record at a range of timescales, focused on, for example, sedimentary and glacial geology, paleontology, geomorphology and landscape evolution, limnology, and paleoclimatology.

  • Geochemical Processes and Elemental Cycles on Earth: An understanding of the chemistry and chemical interactions in the Earth's mantle, crust, or on the surface of the Earth in terrestrial or aquatic environments or in the atmosphere

focused on, for example, biogeochemical processes that govern the distribution and cycling of elements and nutrients, processes that add and remove elements in various environments, or the chemical transformations and exchanges between the atmosphere, oceans, and solid Earth at a range of timescales.

• Ocean Mapping Technology and Applications: An understanding of the physics sound in the ocean, focused on, for example, applications in hydrography to determine the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, harbors, and other water areas, and the tides (or water levels) and currents that occur in those bodies of water, and ocean mapping to determine subsea geomorphology, geologic characterization of the seabed, and mapping of living resources and habitats.

- Demonstrate basic knowledge of how the processes within each of these fields interact with other related disciplines.
- Demonstrate specialized knowledge of a field within geology, geophysics, geochemistry, or ocean mapping sufficient to conduct substantive supervised research.

Research Methods and Analysis

- Identify and demonstrate knowledge of a range of qualitative and quantitative methodologies typically used in geology, geophysics, geochemistry, or ocean mapping research and critically read research that uses these methods.
- Discover and critically read published research in the Earth sciences and related fields of Mathematics, Statistics, Physics, Chemistry, and Biology.
- Frame empirical research and/or theory guided by prior knowledge.
- Implement a rigorous study using appropriate methods, measures and techniques.
- Critically evaluate and systematically analyze data to reach appropriate findings and interpretations Research Independence.
- Develop and implement directed research projects that meets high standards of theoretical and methodological rigor Scholarly Communication.
- Structure a coherent argument that rigorously presents and evaluates evidence to support claims.
- Review and cogently synthesize relevant literature.
- Write at a level and in a style of English consistent with that found in leading academic journals.
- Understand and properly use styles of citing, referencing, and formatting found in leading academic journals.
- Clearly convey research findings through oral presentation supported by appropriate digital media.
- Cogently summarize research and its significance to non-specialist audiences Professionalism and Pedagogy.
- Prepare manuscripts that meet the standards of academic and research journals and respond appropriately to recommendations for revision.
- When demanded, demonstrate collaboration, leadership and teamwork through participation in research teams and lab groups.
- Make effective contributions to university, community and professional service • Communicate effectively to groups in a lecture format.