EARTH SCIENCES: GEOCHEMICAL SYSTEMS (M.S.)

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

Description

The option in Geochemical Systems is intended for students with interests in all aspects of geochemistry: bedrock, sediment, water, ice, and air with particular emphasis on interpreting and modeling the interaction of these media (e.g., biogeochemistry, air quality, and climate change).

Admission Requirements

Applicants to the M.S. program in geochemical systems are expected to have completed coursework that provides them with foundational knowledge. This foundational knowledge is the equivalent to the completion of: two terms mathematics, which includes both differential and integral calculus (one of these two terms could be statistics); two terms lab-based general chemistry; and two terms of a combination of biology and/or physics. Typical applicants have undergraduate (or equivalent) degrees in Earth sciences, environmental sciences, chemistry, physics, mathematics, data science, engineering, the biological sciences, or related fields. We also encourage inquiries from those who have earned an undergraduate degree in a different major with appropriate coursework in foundational subjects. Students still working to strengthen a particular component of their foundational coursework may be admitted provided they are prepared to complete courses, without graduate credit, as needed. The program of study a student wishes to follow, together with the research topic and the student's undergraduate major, determines any additional necessary coursework, which will be recommended during the admission process. Applicants are strongly encouraged to meet with their potential advisor(s) and/or the graduate program coordinator prior to submission of their application with any questions on admissions criteria and the degree program.

Requirements

Degree Requirements Thesis Option

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 master's thesis (6 credits) and give an oral presentation of the results.

Non-Thesis Option

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.

Geochemical Systems

Code	Title	Credits
Required Courses		
ESCI 997	Seminar in Earth Sciences (first year)	1
ESCI 998	Proposal Development (first year)	1
Select two courses from the following:		6-8
ESCI 841	Geochemistry	
ESCI 845	Isotope Geochemistry	
ESCI 847	Aqueous Geochemistry	
ESCI 852	Chemical Oceanography	
ESCI 860	Paleoceanography	
ESCI 865	Paleoclimatology	
NR 844	Biogeochemistry	
Select one course from the following:		4
ESCI 801	Quantitative Methods in Earth Sciences	
ESCI 820	Ocean Measurements Lab	
ESCI 864	Spectral Analysis of Geophysical Time Series Data	
ESCI 877	GIS for Earth & Environmental Sciences	
ESCI 878	Remote Sensing Earth & Environmental Sciences	
Master's Thesis or Directed Research		
Select from the following:		
ESCI 899	Master's Thesis	6
ESCI 898	Directed Research	2
Elective Courses		

Additional electives are to be selected from graduate level courses in the department and/or from graduate level courses 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

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**
Core Curriculum 1 Course		4
Elective I 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		
Core Curriculum 3 Course		3-4
ESCI 899	Master's Thesis (or Elective for non-thesis option)	3-4
	Credits	**6-8**
Spring		
Elective 3 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

Program Learning Outcomes

Students graduating with a MS in Earth Sciences: Geochemical Systems should achieve the following learning outcomes:

Core Knowledge

- Demonstrate a foundation of knowledge in Geochemical Systems that results in expertise and an understanding of the chemistry and chemical interactions of the Earth's mantle, crust, or on the surface of the Earth in terrestrial, aquatic, or atmospheric environments at a range of timescales 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.
- Demonstrate basic knowledge of how the processes within this field interact with other related disciplines.
- Demonstrate specialized knowledge of a field within geochemical processes and elemental cycles on Earth 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 geochemistry research.
- 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

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.
- Demonstrate collaboration, leadership and teamwork.
- Create a welcoming environment that is supportive, inclusive and equitable.
- Make effective contributions to university, community and professional service.
- Communicate effectively to groups in a lecture format.