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

An applicant to the M.S. program is expected to have demonstrated competency in the following college courses: one year each of calculus and chemistry and two semesters of physics and/or biology. In addition, the applicant is expected 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 master's thesis (6 credits) 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.

Geochemical Systems

Code | Title | Credits
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ESCI 997 | Seminar in Earth Sciences (first year) | 1
ESCI 998 | Proposal Development (first year) | 1
Select two of the following courses: | 6-8
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ESCI 841 | Geochemistry | 
ESCI 845 | Isotope Geochemistry | 
ESCI 847 | Aqueous Geochemistry | 
ESCI 852 | Chemical Oceanography | 
ESCI 860 | Paleoclimatology | 
ESCI 865 | Biogeochemistry | 
NR 844 | Biogeochemistry | 4

Additionally, one of the following courses is required:

- ESCI 801: Quantitative Methods in Earth Sciences
- ESCI 820: Ocean Measurements Lab
- ESCI 844: Spectral Analysis of Geophysical Time Series Data
- ESCI 877: GIS for Earth & Environmental Sciences
- ESCI 878: Remote Sensing Earth & Environmental Sciences

Select one of the following courses:

- ESCI 899: Master's Thesis (6 credits)
- ESCI 898: Directed Research (2 credits)

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

First Year

Fall

- 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 Directed Research Option) | 3-4
  **Credits:** 6-8

Spring

- Elective 3 Course | 3-4
- ESCI 899 or ESCI 898: Master's Thesis or Directed Research | 2 or 3
  **Credits:** 5-7

**Total Credits:** 27-33

Student 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.