

# Geology, MS, PhD

**Department:** Geology Department

**College:** College of Science

## Overview

### About This Degree

The Geology Department is one of the oldest departments at Utah State. It fosters a small environment where students are able to interact with faculty and receive specialized attention in their research.

There are multiple areas of research emphasis for graduate students and faculty within the department:

- **Sedimentology and Paleoecology:** Research in sedimentology and paleoecology includes the sequence stratigraphy of Paleozoic mixed carbonate-siliciclastic systems, paleoecology of reef and bioherm communities through time, and Proterozoic basin analysis, isotope geochemistry, and paleobiology.
- **Structural Geology and Regional Tectonics:** Research in structural geology and regional tectonics has included the examination of the mechanical and chemical evolution of fault zones; the structural and tectonic development of extensional structures in the Great Basin; the development of fold-and-thrust structures in Idaho, Montana, Wyoming, and Utah; and the characterization of fluid-flow properties in fractured crystalline and deformed sedimentary rocks.
- **Geomorphology:** Geomorphology research has included the study of climate, tectonic, and anthropogenic controls on landscape change, erosion, and sedimentation. This includes studies on hillslope processes, landscape evolution of the Colorado Plateau and Grand Canyon, the downstream effect of dams, and river restoration.
- **Hydrogeology:** Research activity in hydrogeology has included wellhead protection in confined to semiconfined aquifers, the relationships between stream losses and water table depths, and the identification and geochemical characterization of groundwater recharge to surface streams.
- **Petrology and Geochemistry:** Research in petrology and geochemistry focuses on the origin and evolution of magmatic systems, oceanic lithosphere, collisional orogens, and convergent margin systems. These efforts use field relations, phase chemistry, and whole rock geochemistry to decipher these systems, and their relationship to the tectonic and geochemical evolution of the Earth.
- **Geophysics/Geodynamics:** Research in geophysics/geodynamics includes GPS geodetic measurement and modeling of rifting, orogeny, slow fault slip events, earthquakes and postseismic deformation; geophysical inversion and imaging of subsurface properties using combinations of seismic, gravity, elevation and heat flow data; and regional- to continental-scale mapping of lithospheric strength and rheological properties.
- **Geomorphology and Earth Surface Processes:** The geomorphology and earth surface processes specialization will prepare students for careers in research, monitoring, management and restoration of land surfaces with a particular emphasis on the processes that shape landscapes across multiple scales. A depth of foundational knowledge will be emphasized through geology, hydrology, fluvial geomorphology, fluvial hydraulics and hillslope geomorphology.

### PhD options:

There are two program tracks for the PhD:

- **Academic track:** This is designed to prepare graduates for a career in academia or other teaching-related settings; it includes both coursework in education and classroom teaching experience under the supervision of a faculty teaching mentor.
- **Professional track:** This is designed to prepare graduates for work in professional careers with the petroleum industry, other extractive industries, or environmental and hydrologic consulting. It includes coursework in statistics, information systems, remote sensing, and GIS, and completion of a professional internship is encouraged.

## Career Options

Graduates in geology can pursue careers in the following industries:

- Energy (oil, gas, coal, geothermal)
- Government agencies
- Regulation
- Environmental consulting
- Natural hazards assessment (earthquakes, landslide, etc.)

- Research
- Academia

## What it takes

### Admissions Requirements

Students must have a bachelor's degree in geology, earth science, or any related science discipline. Occasionally, students may need to take one or two prerequisite courses to make up for deficiencies in their undergraduate transcripts. These courses, if needed, will be decided upon by the advisor and graduate committee of the student.

#### Application Requirements:

##### Master's Degree:

- Complete the [online application](#)
- Pay the \$55 application fee
- Score at or above the 40<sup>th</sup> percentile on in the GRE
- Have a 3.0 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation

##### Doctoral Degree:

- Complete the [online application](#)
- Pay the \$55 application fee
- Score at or above the 50<sup>th</sup> percentile on in the GRE
- Have a 3.4 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation
- Applicants for the PhD program are strongly encouraged to have already completed a MS
- Potential graduate students are strongly encouraged to contact those faculty they are interested in working with before applying in order to determine possible graduate research projects.

International students have [additional admissions requirements](#).

### Admissions Deadlines

Applications for the MS and PhD are due by:

- Fall semester - February 15
- The department continues to review applications after this date, but to be considered for assistantships students must meet this deadline.

### Master's Degree Plan Options

Students receive the MS by pursuing the following plan option:

- The **Plan A** option, in which students complete graduate-level coursework and must write a thesis.

### Financial Assistance

The department typically funds all of its graduate students with [research assistantships](#) and occasionally other types of assistantships.

A limited number of scholarships are available through the Geology Department. These change from year to year depending on available funding, so contact the department to see what is currently available.

A variety of additional funding opportunities are available, including [fellowships](#), [scholarships](#), [tuition awards](#), and [travel support](#). Additionally, students may qualify for subsidized [health insurance](#) through qualifying assistantships.

### Program Requirements

[Click here](#) to see course requirements for the **Master of Science**.

[Click here](#) to see course requirements for the **Doctor of Philosophy**.

### **PhD Qualifying Exams:**

All PhD students are required to pass the PhD qualifying exams. They will be assessed using the following standard tools:

- A comprehensive written examination, which tests depth and breadth of knowledge in geology and the student's area(s) of emphasis.
- The candidate must successfully complete a written dissertation research proposal, present that proposal orally and defend it during an oral examination.
- The dissertation and oral dissertation defense, which determine the quality and scope of the research carried out, its originality, and whether the conclusions are consistent with the data produced and with other studies in the same general topic.

## **Contact**

### **Advisor(s)**

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## Get Involved

### Professional Organizations, Honor Societies, and Clubs

**The Geological Society of America:** Established in 1888, the Geological Society of America provides access to elements that are essential to the professional growth of earth scientists at all levels of expertise and from all sectors: academic, government, business, and industry.

**American Geophysical Union:** The American Geophysical Union is dedicated to furthering the geophysical sciences through the individual efforts of its members and in cooperation with other national and international scientific organizations.

### Labs, Centers, Research

**Geochemistry/Analytical Laboratory:** This lab includes Panalytical XPert Pro X-ray diffractometer (XRF), a Philips PW-2400 X-ray fluorescence (XRF) instrument, a new inductively coupled plasma mass spectrometer (ICP-MS), and

other analytical equipment.

**Luminescence Laboratory:** This lab specializes in the analysis of the luminescence signals from quartz grains in geomorphological applications. It currently has two RISO TL/OSL readers and one with a single-grain attachment.

**Rock Preparation Laboratory:** This lab has a rock crusher, corers, trim saws, and thin-section equipment.

**Utah Center for Water Resources Research:** The UCWRR facilitates water research, outreach, design, and testing elements within a university environment that supports student education and citizen training.

**Utah Water Research Laboratory:** The UWRL works on nearly 250 water-related projects a year and has projects in all of Utah's 29 counties and more than 40 countries. The lab is one of the go-to places that addresses the technical and societal aspects of water-related issues, including quality, quantity, and distribution of water.

**Water Initiative:** Utah State University supports a broad community of students and faculty engaged in water education, research, and outreach. The USU Water Initiative provides an overarching umbrella for the activities of this community aimed at fostering interdisciplinary collaboration and collegial sharing of ideas related to water across the departments and colleges of USU.