

# GEOSCIENCE

The interdisciplinary department of Geoscience offers an undergraduate degree in geology and geophysics, with graduate degrees offered in both disciplines.

The Geology and Geophysics major offers unusual opportunities to integrate knowledge and technology from chemistry, biology, physics, engineering, space science, and other disciplines to understand processes that have shaped the Earth, its environments, and the life that it has sustained over billions of years. Geoscientists provide insight on surface and ground water resources and how to protect and preserve them. They probe the causes and potential risks associated with natural hazards including earthquakes, volcanoes, floods, hurricanes, landslides, climate change, and sea level rise. Sustainable exploration and extraction of key mineral resources needed to build and power a resilient and green society depends on well-trained geoscientists. To explore Earth history, develop materials and energy resources, and to take the pulse of a dynamic planet, geoscientists use an extraordinary array of tools including satellites to measure changes of Earth's surface, sensitive instruments to detect seismic waves for exploring resources underground, cutting-edge instrumentation to measure the composition of minerals and rocks at microscopic scales, and computational approaches to assemble and interrogate enormous sets of data acquired from rocks and fossils across the globe.

Geology students have a strong interest in the natural environment as it is today and as it has developed over the past 4.5 billion years. The department of Geoscience challenges students to develop skills in sequential thought, inductive reasoning, and three-dimensional perception. Moreover, students who concentrate in geophysics learn basic physical laws and processes involving gravity, magnetism, heat flow, and seismic wave propagation within Earth. Opportunities also include learning how satellite-based measurements, and computational approaches, are used to measure and monitor geothermal resources, volcanic activity, earthquakes, and groundwater movement.

Geology and Geophysics students prepare for careers in hydrogeology, energy, mining, engineering, and education. Students are exceptionally well-prepared for graduate studies in a broad array of geoscience fields.

## CAREERS

More than half of all professional geologists and geophysicists work in hydrogeology, engineering geology, technical consulting, mining, or energy resource industries. The need for energy, environmental protection, and responsible land and resource management is expected to spur future demand for geoscientists. Geoscientists will be involved in discovering and developing next generation energy and mineral resources\*. Such careers involve an unusual breadth of training and personal adaptability, and the M.S. degree is generally required. About one fifth of all geoscientists work in state and federal geological surveys or research activities. These positions largely involve problems in geologic mapping, mineral resources, groundwater, and engineering. Geophysics offers opportunities in earthquake studies, seismic verification of nuclear test bans, and rock characterization techniques for waste disposal and groundwater modeling. Many geology students continue on to obtain a Ph.D. degree and become faculty members at colleges or universities. A geology and geophysics major is also appropriate for those interested in careers in elementary or

secondary education, environmental policy, or environmental law. Faculty advisors can provide additional information on career opportunities.

\*US Bureau of Labor Statistics, November, 2022 ([http://guide.wisc.edu/undergraduate/letters-science/geoscience/file:///C:/Users/ljtheo/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/EZH4LLMB/Vy%20Le%20\(left\)%20and%20Collin%20Sutton%20\(right\)%20completed%20imaging%20experiments%20in%20May%202022%20in%20the%20University%20of%20Wisconsin-Madison%20Small%20Animal%20Imaging%20and%20Radiotherapy%20Facility%20\(SAIRF\).%20Imaging%20experiments%20are%20used%20to%20quantify%20in%20situ%20flow%20and%20transport%20processes%20in%20rocks%20and%20packed%20columns/](http://guide.wisc.edu/undergraduate/letters-science/geoscience/file:///C:/Users/ljtheo/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/EZH4LLMB/Vy%20Le%20(left)%20and%20Collin%20Sutton%20(right)%20completed%20imaging%20experiments%20in%20May%202022%20in%20the%20University%20of%20Wisconsin-Madison%20Small%20Animal%20Imaging%20and%20Radiotherapy%20Facility%20(SAIRF).%20Imaging%20experiments%20are%20used%20to%20quantify%20in%20situ%20flow%20and%20transport%20processes%20in%20rocks%20and%20packed%20columns/))

The College of Letters & Science encourages majors to begin working on their career exploration and preparation soon after arriving on campus. Our department partners with SuccessWorks at the College of Letters & Science. L&S graduates are in high demand by employers and graduate programs. It is important that students are career ready at the time of graduation, and we are committed to their success.

## PREPARATION FOR GRADUATE STUDY

An advanced degree is normally required for professional activity in geological and geophysical sciences; the student who contemplates such a degree should satisfy both department and graduate school requirements for admission to graduate study.

Minimum requirements for admission to graduate work in geology or geophysics at most universities in the United States, including the University of Wisconsin-Madison, are:

1. A bachelor's degree in geology/geophysics or a related science
2. One year of college chemistry (one year high school plus CHEM 109 Advanced General Chemistry recommended)
3. One year of college physics (PHYSICS 207 General Physics-PHYSICS 208 General Physics recommended)
4. One year of calculus (MATH 221 Calculus and Analytic Geometry 1-MATH 222 Calculus and Analytic Geometry 2 recommended)
5. A summer field-mapping course equivalent to GEOSCI 459 Field Geology (Park City, Utah)

## DEGREES/MAJORS/CERTIFICATES

- Geology and Geophysics, B.A. (<http://guide.wisc.edu/undergraduate/letters-science/geoscience/geology-geophysics-ba/>)
- Geology and Geophysics, B.S. (<http://guide.wisc.edu/undergraduate/letters-science/geoscience/geology-geophysics-bs/>)

## PEOPLE

Professors Dutton, Feigl, Goodwin, Kelly, Meyers, Peters, Roden, Singer, Tikoff, Xu

Associate Professors Cardiff, Ferrier, Marcott, Zoet

Assistant Professors Bauer, Bonamici, Golos, Haseloff, Zahasky