



GEOLOGY

Option

at
Montana State University

What is the Geology Option in Earth Sciences?

The Geology Option is a rigorous scientific degree program designed for those students who are motivated to apply the principles of chemistry, physics and mathematics to the study of the Earth's interior and surface. The Geology Option offers a broad-based foundation of course work from geology and other physical sciences, in addition to mathematics, statistics, computer science, and the humanities. The geology faculty strives to give students as much hands-on, field-based instruction as possible, taking advantage of the tremendous natural laboratory that surrounds Bozeman. The optimal degree for employment in the geological sciences is the Masters of Science degree, and the undergraduate Geology Option is an excellent preparatory degree for advanced geoscience studies and research.

What courses would I take in the Geology Option?

In the Geology Option, undergraduate students progress through a broad-based core of courses which includes introductory (physical) geology, mineralogy, igneous petrology, metamorphic petrology, sedimentary petrology, historical geology, sedimentation and stratigraphy, structural geology, geomorphology, undergraduate seminar in geology, earth science writing, and an intensive six-week summer field course. These courses are integrated to build scientific problem solving skills throughout the four year program, based on developing skills in 1) observation (freshman level), 2) description (sophomore level), 3) interpretation (junior level), and 4) integration of knowledge (senior and graduate level). In addition, students are required to take a minimum of one course from a block of hydrology courses and one course from a block of remote sensing/GIS courses. This requirement serves to round-out the required courses in geology, providing a diversified undergraduate background. Elective courses in geology permit students to explore areas of interest such as volcanology, glacial geology, tectonics, paleontology, environmental geology, hydrology, and others. Lastly, students may explore "emphases" in geology, such as *active geologic processes and hazards* or *crystallography, mineralogy and earth materials*. These emphases are groupings of electives that build strength in these areas, for students wishing to focus on these topics. In summary, the geology undergraduate course work, coupled with classes in the allied sciences and mathematics, is thorough preparation for post-graduate employment and/or graduate studies in geoscience.

What opportunities for fieldwork are there in the Geology Option?

If you like the natural sciences and being outdoors, then the Geology Option is for you! Most of the faculty in this department gravitated towards geology in their early years because of an outdoor lifestyle and love for the mountains. For many of us, our first class in geology was a profound awakening that offered explanations for landforms and rock formations we've seen, but never understood before. Field work is at the heart of geoscience, so in this spirit we try to provide field trips and field courses that enrich the undergraduate education of our students. Fortunately, this is easy to do at Montana State University! We are surrounded by some of the best exposed, easily accessible, diversified and spectacular geology in North America. It is no surprise that dozens of universities from around the country come to southwest Montana each summer for their field courses. In addition to field trips taken during lab periods or on the weekends, we offer larger duration field courses in geology and paleontology. Our geology field course is taken near the end of your undergraduate

career and is an intensive six-week course that focuses on *geological mapping* in a variety of complex localities in the region. Students often view this course as the crowning experience that “makes them a geologist.”

What are the career opportunities in Geology?

Geologists have traditionally been employed to assist in the discovery and extraction of natural resources, such as precious metals, base metals, petroleum and natural gas, coal, water, and a multitude of commodities used in everyday life. In addition to these traditional jobs, there is a vast array of employment opportunities associated with environmental clean-up and containment of environmental hazards, mitigation of future environmental problems, preservation of water resources (surface and groundwater), and other human impacts on natural systems that sustain life on this planet. In addition, there are growing opportunities for employment in the private and public sector in geological engineering, earthquake geology and seismology (including earthquake and volcanic risk assessment in populated regions), land use and development (coupled with GIS technology), climate change, and other areas where the ever-increasing human population comes into conflict with natural earth processes and/or over-development of finite earth resources. It is clear that environmental and societal issues will influence career opportunities in the geological sciences in future years.



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