



at
Montana State University

PALEONTOLOGY

Option

What is the Paleontology Option in Earth Sciences?

The Paleontology Option offers students a general geology degree with an emphasis in paleontology. Over 95% of all species that have ever existed are now extinct and biological diversity in past was far greater than today. The Paleontology Option, therefore, examines biological and geological processes that influence the diversification and extinction of a wide range of organisms, from microbes to plants and animals. This multi-disciplinary study investigates the history of life recorded in the rock record, the structure of past ecosystems, and patterns of evolution.

What courses would I take in the Paleontology curriculum?

Geology and paleontology incorporate a wide variety of analytical methods in the study of the Earth and ancient life. Consequently, lower division courses in the Paleontology Option introduce students to the fundamental principles of chemistry, physics, mathematics, and biology. Courses in physical geology and geography provide an overview of the Earth's physical processes and their spatial distribution.

Proper analysis of fossils comes only through understanding their geologic context. Upper division courses in mineralogy and petrology provide the analytical tools for interpreting the rock record. Structural geology, geomorphology, and sedimentology further highlight processes such as plate tectonics, mountain building, erosion, and sediment deposition. Historical geology, vertebrate and invertebrate paleontology introduce students to the major fossil groups and their morphology, evolution and extinction. Additional courses cover vertebrate anatomy, macroevolution, and dinosaur paleontology. Classes in taphonomy, field paleontology, and laboratory techniques emphasize analytical methods, while the six-week geology field course provides experience and practical training in field geology. In addition, statistics and Earth Sciences writing and seminar classes are designed to further enhance students' critical reading, writing, and analytical skills.

Are there hands-on opportunities in Paleontology?

Montana provides an excellent outdoor laboratory for geology, with rocks ranging in age from the Precambrian (approximately a billion years old) to the present. Dinosaur-bearing strata are particularly well represented in the state. The Paleontology Option includes eight credits that consist exclusively of fieldwork and many upper division courses provide additional opportunities for field-based projects. Paleontologists at Montana State University have active research programs and conduct paleontology field work every summer. Students gain valuable experience by volunteering for these field crews and the faculty enthusiastically support undergraduate research projects. In addition, the Department of Earth Sciences and the Museum of the Rockies provide training and experience in fossil preparation, including volunteer positions and student employment.

How does the Paleontology Option prepare me for more advanced training and employment?

This Option within the Department of Earth Sciences incorporates in-depth paleontology training with a basic geology degree. Students completing this program generally exhibit a strong aptitude for geologic interpretations, based on field observations. The field-based emphasis of this curriculum allows students to acquire practical experience that is important to industry, research, and academic employment. Student participation in research activities also offers opportunities generally not

available at the undergraduate level. This knowledge of basic research methods provides a competitive advantage to students pursuing employment or advance degrees in paleontology or geology. Although employment in paleontology remains somewhat limited, increasing public interest in recent years has expanded the opportunities for employment in areas such as museum exhibit design and construction, public education, fossil preparation, and collections management, in addition to traditional research and academic positions. Geology-related employment includes a variety of subject areas, including education, research, mineral and energy exploration and development, land use applications, environmental hazards, surficial processes, and climate change.



What graduate degrees in Paleontology are offered and what are the strengths of the department?


The Department of Earth Sciences at MSU offers excellent opportunities for students to pursue graduate level research in paleontology. Montana provides diverse field localities spanning the Phanerozoic, with extensive Mesozoic and Cenozoic exposures. Analytical equipment available through the Image and Chemical Analysis Laboratory (ICAL) and the Gabel Laboratory for Cellular and Molecular Paleontology at the Museum of the Rockies includes a wide range of chemical, mineralogic, histologic and microscopic instrumentation. In addition, the museum houses a world-class collection of Mesozoic fossils, with over 20,000 cataloged specimens. Finally, faculty in paleontology and sedimentology pursue active research programs throughout Montana, the American West, and abroad.

The two-year Masters of Science (M.S.) degree program requires a thesis project in which students conduct independent research. Students complete 30 graduate credit hours, including a minimum of 20 credits of 400- and 500-level courses and a one-credit course in research design. Those students lacking appropriate undergraduate coursework are required to make up the deficiencies before or during the graduate program. All students must successfully complete a comprehensive oral exam and public defense of their thesis project.

Doctor of Philosophy (Ph.D.) candidates develop focused and intense research in a specific field. Students with a relevant M.S. degree must complete 30 graduate credits, including 12 credits of course work. Those without a master's degree complete 60 credits, including 32 credits of coursework, with no more than nine credits of 400-level classes. Additional requirements include a written qualifying exam and oral defense of the dissertation proposal, written and oral comprehensive exams, and a final dissertation defense.

For more information, visit our websites!

Paleontology website: www.homepage.montana.edu/~espaleo
Department of Earth Sciences website: www.montana.edu/wwwes

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