

GEOLOGY

OVERVIEW

The Master of Science in geology is a rigorous research thesis program with grounding in related course work. Research programs include environmental geology; geomorphology; water resources; environmental (bio)geochemistry; mineralogy; sedimentary, igneous and metamorphic environments; geochronology and structural geology; tectonics; and the evolution of orogenic belts. Examples of specific faculty interests include geologic history and recent sedimentation in the Lake Champlain Basin; processes and chronology of glaciation; stable and cosmogenic isotopic studies; water quality and pollutant transport; crystal chemistry and crystallography; mineral structure analysis; molecular-scale environmental mineralogy; (bio)geochemical cycling in the critical zone; the tectonic evolution of deformed continental margins and interiors; petrofabric and structural analysis of deformed rocks; partial melting processes; and stratigraphy and sedimentary environments of lower Paleozoic sandstones and carbonates.

DEGREES

- Geology M.S.

FACULTY

Bierman, Paul Robert; Professor, Department of Geology; PHD, University of Washington

Hughes, John M.; Professor, Department of Geology; PHD, Dartmouth College

Klepeis, Keith Andrew; Professor, Department of Geology; PHD, University of Texas Austin

Lini, Andrea; Associate Professor, Department of Geology; PHD, ETH-Zurich

Mehrtens, Charlotte Jean; Professor, Department of Geology; PHD, University of Chicago

Perdrial, Julia N.; Assistant Professor, Department of Geology; PHD, Université Louis-Pasteur

Perdrial, Nicolas; Research Assistant Professor, Department of Geology; PHD, Université Louis-Pasteur

Schroth, Andrew W.; Research Assistant Professor, Department of Geology; PHD, Dartmouth College

Webb, Laura E.; Associate Professor, Department of Geology; PHD, Stanford University

Courses

GEOL 201. Advanced Field Geology. 3 Credits.

Advanced field mapping techniques, analysis of field data, preparation of geological maps and reports. Prerequisite: GEOL 101.

GEOL 217. Vermont Field Geology. 3 Credits.

Field observations of rocks and surficial materials across northern Vermont are utilized to decipher the region's geologic history. Readings complement field work. Prerequisite: Graduate student standing.

GEOL 231. Petrology. 4 Credits.

The course covers the scope and methods of igneous, sedimentary and metamorphic petrology, and the geologic environments and processes relevant to the major rock types. Prerequisite: GEOL 110.

GEOL 233. Environmental Isotope Geochem. 3 Credits.

Course focuses on stable isotope geochemistry of low temperature processes occurring on and near the earth surface through lecture, laboratory, and seminar. Prerequisite: CHEM 031.

GEOL 234. Global Biogeochemical Cycles. 3 Credits.

Integrated perspective on biogeochemical cycles describing the transformation and movement of chemical substances in the natural environment, as seen on the global context. Prerequisite: CHEM 031.

GEOL 235. Geochemistry of Natural Waters. 3 Credits.

Basic concepts of chemical equilibria applied to natural waters, including thermodynamics, pH, oxidation-reduction, weathering, and solution equilibria. Prerequisite: Prerequisite: CHEM 032.

GEOL 240. Tectonics. 3 Credits.

Applications of igneous and metamorphic petrology to problems in tectonophysics, including petrochemistry of the earth's crust and upper mantle and the internal structure of orogenic belts. Prerequisites: GEOL 101, GEOL 110.

GEOL 242. Basin Analysis. 3 Credits.

This course examines the formation and evolution of sedimentary basins, including tectonic setting, sediment supply, and subsidence history. Prerequisite: GEOL 153.

GEOL 246. X-ray Diffractometry. 3 Credits.

This course focuses on identification and characterization of materials using X-ray diffractometry. The course will include exercises using a modern powder diffractometer. Prerequisite: CHEM 032.

GEOL 260. Structural Geology. 0 or 4 Credits.

Examines processes and problems concerning the mechanical behavior of the Earth's crust and surface. Includes rock deformation stress, strain, and the interpretation of geological structures. Prerequisites: GEOL 101, GEOL 110.

GEOL 263. Geochronology. 3 Credits.

This course will survey the basic concepts of radioactive decay, mass spectrometry, and isotopic systems commonly used to quantify the timing of geologic events. Prerequisite: GEOL 110.

GEOL 265. Geomicrobiology. 3 Credits.

An introduction to microbial control of redox chemistry on Earth's surface, including field techniques and a detailed look at how microbes affect element cycling. Prerequisite: GEOL 135.

GEOL 266. Microstructures. 3 Credits.

This course will focus on deformation of rocks and minerals at the microscopic scale and the practical use of photographic analyses to unravel tectonic histories. Prerequisite: GEOL 260.

GEOL 272. Regional Geology. 0 or 4 Credits.

Discussion of the geology of a selected region of North America; a four-week summer field trip to the area in question. Prerequisites: GEOL 101, GEOL 110.

GEOL 273. Geology of the Appalachians. 3 Credits.

Origin of mountain belts; the Appalachian mountain system discussed in terms of tectonics and geologic processes active in modern continental margins. Prerequisites: GEOL 101, GEOL 110.

GEOL 295. Advanced Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.

GEOL 296. Advanced Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.

GEOL 301. Intro to Graduate Studies. 1 Credit.

For first year graduate students in Geology. Includes orientation to faculty, abstract and grant writing, comprehensive exams, talk preparation and scientific method in the Geosciences. Prerequisite: Graduate standing in Geology.

GEOL 302. Intro Graduate Studies Geology. 1 Credit.

For first year graduate students in Geology. Includes orientation to faculty, abstract and grant writing, comprehensive exams, talk preparation and scientific method in the Geosciences. Prerequisite: Graduate standing in Geology.

GEOL 335. Aqueous Environmental Geochem. 3 Credits.

This course focuses on the chemical equilibrium and kinetics principles governing water chemistry, including water interaction with the atmosphere, microbes and minerals. Prerequisite: Graduate standing.

GEOL 351. Surface Proc & Quaternary Geol. 1-3 Credits.

Discussion and critique of scientific literature pertaining to Earth surface history and processes. Critical examination of author's methods, data, and assumptions. Student-led discussions. Specific focus changes yearly. Prerequisite: Graduate standing in science, natural resources or engineering.

GEOL 352. Environmental Geology Seminar. 1-3 Credits.

Geologic constraints on environmental problems including: groundwater flow, contaminant transport, slope stability, climate change, sedimentation, deforestation and earthquake hazards. Extensive readings and student-led discussions. Prerequisite: Graduate standing in science, natural resources, or engineering.

GEOL 360. Structural Anyl Deformed Rocks. 4 Credits.

Mechanisms of rock deformation; fracture phenomena and analysis; fault zone characteristics; fold generation analysis. Stress and strain interpretation of deformational features in rocks and minerals. Field work. Prerequisite: GEOL 260.

GEOL 361. Advanced Structural Geology. 3 Credits.

Selected topics in analytical structural geology. Prerequisite: GEOL 260.

GEOL 371. Advanced Readings. 1-3 Credits.

Readings and research problems intended to contribute to the program of graduate students in areas of geology for which formal courses are not available. Prerequisite: Graduate standing in Geology.

GEOL 384. Teaching in the Geosciences. 1 Credit.

A review of the pedagogical underpinnings of introductory geology and its laboratory activities.

GEOL 385. Teaching in the Geosciences. 1 Credit.

A review of the pedagogical underpinnings of introductory geology and its laboratory activities.

GEOL 391. Master's Thesis Research. 1-9 Credits.