GEOLOGY

http://www.uvm.edu/~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 orogen. Examples of specific faculty interests include geologic history and recent sedimentation in the Lake Champlain Basin; processes and chronology of glaciation; stable and cosmogetic 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 continental margins and interiors; petrofabric and structural analysis of deformed rocks; partial melting and deep crustal processes; timing of deformation and rates of tectonic processes; and stratigraphy and sedimentary environments of lower Paleozoic sandstones and carbonates.

DEGREES

- Geology M.S. (http://catalogue.uvm.edu/graduate/geology/geologyms/)

FACULTY

Bierman, Paul Robert; Professor, Department of Geology; PHD, Dartmouth College
Hughes, John M.; Professor, Department of Geology; PHD, University of Texas Austin
Klepis, Keith Andrew; Professor, Department of Geology; PHD, ETH-Zurich
Perdrial, Julia Nathalie; Assistant Professor, Department of Geology; PhD, University of Paris, France
Perdrial, Nicolas; Research Assistant Professor, Department of Geology; PhD, Université Louis-Pasteur, Strasbourg, France
Schroth, Andrew W.; Research Associate 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. 4 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 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 249. Crystal Chemistry. 3 Credits.
A hands-on course involving crystal structure solutions, wherein grading will be based on various class projects, not examinations. Students will gain a deep understanding of how Nature arranges matter on Earth, and how to determine the atomic arrangement of compounds using X-ray diffractometry. Prerequisites: GEOL 110 or GEOL 246; or Chemistry, Physics, or Material Science major and minimum Junior standing; or graduate standing in Chemistry, Physics, or Material Science.

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 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 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 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 355. Critical Writing in Science. 3 Credits.
Learn how to write better papers, give exciting presentations, and do peer-reviews. Write and review abstracts, articles, and professional presentations. Refine public science communication techniques including radio interviews and pitching work to the media. Takes a hands-on approach to improving science communication. Prerequisite: Graduate Student standing in science, mathematics, natural resources, agriculture and life sciences, plant and soil science, or engineering, or undergraduate thesis writers in these fields by Instructor permission.

GEOL 360. Structural Analysis 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 391. Master’s Thesis Research. 1-9 Credits.

GEOL 392. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.