

## Department of Geology

### Geology Course Descriptions

Note: Some Geology courses include or require co-registration with a laboratory component. See descriptions for details.

**GEOL 195, 295, 395, 495 – Special Topics (1-12)**

**GEOL 198, 298, 398, 498, 598 – Tutorial (1-3)**

**GEOL 101 – Environmental Geology (3)** A study of geology and the human environment. Topics begin with the basics of geology: minerals and rocks, the earth's internal structure, earthquakes, volcanoes and plate tectonics. Surface processes affecting the environment include stream behavior and flooding, groundwater, and air pollution. The course examines laws governing the extraction and use of water, as well as energy sources and environmental concerns. Laboratory includes field trips in the Potsdam area and the use of geological and topographic maps. Lab required. Gen Ed: SP & LB credit. Fall and Spring.

**GEOL 102 – Ancient Life (3)** This is a survey course designed to describe the countless forms of organisms that have lived on the Earth since it formed 4.6 billion years ago. We will explore how and why those organisms evolved and why many went extinct, and also the ecological interactions between organisms with the physical environment. Other major topics are: understanding evolution, tracing evolutionary relationships, and interpreting the behavior of extinct organisms. Gen Ed: SP credit. Fall.

**GEOL 103 – Physical Geology (3)** Minerals, rocks, rock deformation, maps, geological processes that shape the land, environmental geology. Lab required. Gen Ed: SP & LB credit. Fall and Spring.

**GEOL 125 – Dynamic Earth (3)** This course covers topics in earth systems science including geology, earth history, plate tectonics, the hydrosphere, the atmosphere, energy and the environment. The intent is to provide exposure to a wide variety of topics in the earth sciences. The course will be supplemented with discussions of current events and discoveries related to the earth sciences, and local geological features. Gen Ed: SP & LB credit. Fall and Spring.

**GEOL 204 – Historical Geology (3)** Historical Geology is the second course in the geology sequence and builds upon the basic geologic principles introduced in 100-level courses. The first half of the course focuses on the methods and principles that geologists use to interpret Earth History; the second half of the course focuses on Earth systems history (climate, oceans, atmosphere, geologic processes and life). Prerequisite: GEOL 101 or 103 or 125. Lab required. Gen Ed: SP & LB credit. Fall and Spring.

**GEOL 300 – Field Geology (2)** Field studies in northern New York stressing map making, data collection, field descriptions, note taking, and use of GPS. Prerequisite: GEOL 204.

**GEOL 301 – Sedimentary Geology (4)** Study of sediment transport and deposition, classification and description of clastic and carbonate sedimentary rocks, depositional environments, and an introduction to stratigraphy (emphasis is on lithostratigraphy, biostratigraphy, and sequence stratigraphy). Mandatory week-end field trip to southern New York. Prerequisite: GEOL 204. Lab required. Spring.

**GEOL 302 – Principles of Paleontology (4)** Topics covered in this class include: paleoecology, systematics, evolutionary development, functional morphology, biogeography, diversity, and extinction. Labs focus on invertebrate organisms and their use as environmental indicators and in stratigraphic correlation. Prerequisite: GEOL 301 or permission for Biology majors or minors. Prerequisite: GEOL 204. Lab required. Spring.

**GEOL 303 – Geologic Maps and Cross Sections (2)** A comprehensive introduction into the use of geologic maps and cross sections as tools for understanding the geologic history of an area. Specific topics include the relationships between geology and topography, interpretation of geologic structures, quantifying the attitude and position of geologic units, and temporal relationships between units and structures. Course complements the field-based techniques emphasized in Field Geology (GEOL 300) and provides students with exposure to regional mapping problems. Prerequisite: GEOL 204. As needed.

**GEOL 306 – Geology of our National Parks (3)** Study of geologic processes using national parks as examples. Processes studied include sedimentology, stratigraphy, volcanology, glaciology, cave formation and tectonics. National parks studied include Grand Canyon, Arches, Mt. Rainier, Zion, Canyonlands, Badlands, Yosemite, Hawaii Volcanoes, Glacier, Yellowstone, Grand Tetons, Carlsbad Caverns, Mammoth Caves, Acadia and Shenandoah. Prerequisite: GEOL 101, 103 or 125. Gen Ed: SP credit. As needed.

**GEOL 311 – Mineralogy & Optical Mineralogy (4)** This course focuses on (1) The identification, classification and study of minerals and mineral groups with an emphasis on crystal chemistry, symmetry, and the geologic conditions under which they form, and (2) the theory of light behavior in minerals and its application to study rocks and minerals in thin section using petrographic microscopes. Field trips to the St. Lawrence Valley and Adirondack Mountains. Prerequisites: GEOL 101, 103, or 125 + CHEM 105 and CHEM 106. Lab required. Fall.

**GEOL 321 – Igneous & Metamorphic Petrology (4)** Study of origin and evolution and mineralogical composition of igneous and metamorphic rocks. Prerequisite: GEOL 311. Lab required. Spring.

**GEOL 340 – Geographic Information Systems (4)** Lecture/Lab. Introduction to basic cartographic principles (projections, datums, etc.), theory and applications of global positioning systems, design and interpretation of maps. ArcGIS software will be used to introduce the theory and applications of GIS, create and edit maps and databases, and perform spatial analysis. Sophomore standing. Fall and Spring.

**GEOL 395 – Climate Change: Past & Present (3)** This course introduces students to the fundamentals of climate science, the geologic record of climate change, the tools used to reconstruct past climates, natural and anthropogenic influences on climate, and predictions of future climate change. Particular emphasis is placed on how the atmosphere, oceans, life, geology, and orbital parameters influence climate and the complex interactions/feedbacks between these systems. Prerequisite: GEOL 204 or (GEOL 102 or 103 and CHEM 105). As needed.

**GEOL 405 – Structural Geology (4)** Study of folds, faults and shear zones in the Earth's crust on macroscopic and microscopic scale. Lab. Field studies in northern New York. Prerequisites: GEOL 204 and junior or senior standing. Lab required. Gen Ed: WI credit. Fall.

**GEOL 406 – Geomorphology (4)** Comprehensive study of the earth's surface and the forces that shape it. Topics include mass movement, drainage basins, river processes, glaciers and glacial deposits, and coastal environments. Prerequisites: GEOL 101, 103 or 125 and Junior standing. Lab required. Spring.

**GEOL 410 – Hydrology and Hydrogeology (4)** Study of the abundance, distribution and movement of fresh water in the atmosphere, on the surface, and in the sub-surface. Prerequisites: GEOL 102, 103, or 125 and CHEM 105 or MATH 110 or MATH 125 or Math 141 or MATH 151. Lab required. Spring.

**GEOL 411 – Paleoecology (3)** In this course, we will apply topics in modern paleoecology to the fossil record. Each topic is introduced through a short lecture then expanded upon using reading assignments from the primary literature. Junior Standing. Spring.

**GEOL 420 – Geochemistry (3)** Study of major and trace element distribution in rocks, magma formation, radiogenic isotope systematics, fluid inclusions, weathering, diagenesis, alteration, mineral stability, and stable isotope fractionation utilizing chemistry-based principals. Prerequisites: GEOL 311 and CHEM 105 & 106. Pre- or corequisite: GEOL 311. Gen Ed: SI credit. Fall.

**GEOL 440 – Economic Geology (3)** Study the genesis and geology of ore deposits including base- and precious-metals, gems, coal, petroleum, and industrial rocks and minerals. Discuss how society uses each material, the environmental implications of doing so, and the remediation steps necessary to minimize the associated environmental impact. Prerequisite: GEOL 311. Corequisite: GEOL 321. Lab required. Spring.

**GEOL 452 – Geology of Nova Scotia – Field Trip (2)** Students will learn about the geology of Nova Scotia via a mandatory field trip (summer). Field trip involves strenuous hikes over irregular terrain in variable weather. Specific stops include the fossil forests of the Joggins Fossil Cliffs World Heritage Site, Triassic rift basin deposits (desert deposits, dinosaurs, and basalt flows), Mississippian lake deposits with some of the oldest terrestrial tetrapods, an upside down angular unconformity at Rainy Cove, and many others. Following the trip, students may complete

a research project (GEOL 453) on one of the areas visited. Prerequisite: GEOL 204 and permission of instructor. As needed.

**GEOL 453 – Geology of Nova Scotia – Research (2)** This course is the academic follow up to the Geology of Nova Scotia field trip. Students will build upon their field experiences and select a semester-long research topic related to one of the destinations visited on the summer field trip. Students will learn about the fundamentals of research and scientific writing in the geosciences via discussions and exercises that explore plagiarism, citation styles and conventions, the structure of research papers, the peer-review process, style and composition. Final projects include a fully-referenced review paper and a poster presentation. Prerequisite: GEOL 452.

**GEOL 475 – Geology Laboratory Techniques (1)** Experience in laboratory instruction under supervision and guidance of a faculty member. Prerequisites: GEOL 204 and permission of instructor. Tutorial. Fall and Spring.

**GEOL 480 – Geology Research (3)** Original research designed to give practical experience in any area of geology. Open primarily to upper-division geology majors and only on advisement. Research conducted in cooperation with a geology professor. Instructor permission required. Fall and Spring.

**GEOL 575 – @Geology Laboratory Techniques (1)** Experience in laboratory instruction under supervision and guidance of a faculty member. Prerequisites: GEOL 204, graduate standing, permission of instructor. Tutorial. Fall and Spring.