Geology
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Stephen A. Nelson, Ph.D., California, Berkeley
Assistant Professors
Mead A. Allison, Ph.D., SUNY, Stony Brook
Bernard J. Coakley, Ph.D., Columbia
Nancye H. Dawers, Ph.D., Columbia
Franco Marcantonio, Ph.D., Columbia
Shuhai Xiao, Ph.D., Harvard
Emeritus Faculty
John P. McDowell, Ph.D., Johns Hopkins
Emily H. Vokes, Ph.D., Tulane

B.S. in Geology

Major
The major in geology provides students with an understanding of the materials that make up the Earth, the history of the Earth, and physical, chemical, and biological processes that have operated on and within the Earth throughout its history.

The major consists of a minimum of ten geology courses including Geology 111/113, 112/114, 211, 212, 340, 399, 609, 627, and two additional 600-level courses including accompanying laboratories where scheduled. Students must earn a C- or better in 211 to qualify for further enrollment in geology courses. All majors must complete Chemistry 107 and 108 and accompanying laboratories 117 and 118; and Physics 121 and 122, or 131 and 132, with laboratories. Mathematics taken to meet the B.S. degree requirement must be Calculus 121 and 122, or Consolidated Calculus 131. Introduction to Calculus 115 and 116 may substitute for Calculus 121. These supporting science and mathematics courses may not be taken satisfactory/unsatisfactory.

In the junior and senior years, students preparing to enter graduate school in geology or paleontology are strongly urged to elect additional courses in their major field. It should be noted that such preparation may result in students’ attaining more than the total number of credits required for graduation (see provisions for earning graduate credit in the senior year).

All majors are expected to participate in certain departmental activities including departmental field trips held annually or semianually, and special lecture programs with visiting speakers.

Minor
A minor in geology consists of five courses and accompanying laboratories as follows: 111/113, 211, 212 plus two courses at or above the 300 level.

B.A. in Earth Sciences

Major
The major in earth science provides students with an understanding of the materials that make up the Earth, the history of the Earth, and physical, chemical, and biological processes that have operated on and within the Earth throughout its
history. The major in earth sciences consists of a minimum of seven geology courses including Geology 111/113, 112/114, 202, 211, 212, 609, and 627 with accompanying laboratories where scheduled, Chemistry 107 and 108, plus four other coordinated courses from the fields of astronomy, biology, chemistry, geography, geology, mathematics, physics, and relevant courses in nonscience departments. The major will be worked out by the student and the undergraduate major advisor in the Department of Geology. This is not considered to be a preprofessional program and is designed for students who are interested in environmental concerns, premed, prelaw, primary or secondary education, or a liberal education in the sciences.

**Minor**

A minor in earth sciences consists of five courses with accompanying laboratories where scheduled, as follows: 111/113, 112/114, 202 plus two additional courses in geology, one of which must be above the 200 level; or 111/113, 112/114, 609 plus two courses from the following: 306, 610, 627, or Ecology and Evolutionary Biology 614.

**GEOL 111 Physical Geology (3)**
Staff. Corequisite: 113. The nature and material of the Earth and the moon; the development of their surficial features; and the results of the interaction of chemical, physical, and biological factors upon them. Lectures.

**GEOL 112 Historical Geology (3)**
Mr. Parsley, Mr. Skinner. Corequisite: 114. The physical evolution of the Earth with particular attention to North America. Also, the evolution of life through geological time.

**GEOL 113 Physical Geology Laboratory (1)**
Staff. Corequisite: 111. A laboratory to accompany Geology 111. Includes the study of rocks and minerals, landforms, structural geology, topographic maps, and aerial photographs.

**GEOL 114 Historical Geology Laboratory (1)**
Staff. Corequisite: 112. A laboratory to accompany Geology 112. Includes the study of fossils, geologic time, geologic maps.

**GEOL 121 Oceanography (3)**
Mr. Bianchi. A broad survey of chemical, physical, and geological oceanography with a brief historical overview and a consideration of current concepts. This course meets the college non-laboratory science requirement, but it cannot count toward any major or minor requirements in ecology and evolutionary biology. Same as EEOB 121.

**GEOL 202 Environmental Geology (3)**
Staff. The interaction of humans and their geologic environment. A study of Earth processes and their action on rocks, soil, fluids, and life in ways that either affect or control the human environment. The effect of humans on their environment through the action of these processes. This course requires a term project which includes both an oral component and a written component.

**GEOL 204 Natural Disasters (3)**
Mr. Nelson. An examination of the causes, effects, and options available to mitigate natural disasters, such as earthquakes, volcanic eruptions, landslides, subsidence, coastal erosion, flooding, severe weather, and meteorite impacts.

**GEOL 206 Introductory Geography (3)**
Staff. An introduction to the basic facts concerning the physical environment: landforms, climates, vegetation and soils, followed by a comprehensive survey of the relationship between the physical environment and human activity in the major geographic regions of the world. The geography of Louisiana is considered in its relation to the region. Recommended to students working for Louisiana certification in elementary education. Lectures.

**GEOL 211 Mineralogy (4)**
Mr. Flowers, Mr. Nelson. Prerequisites: GEOL 111 and concurrent enrollment in CHEM 108 and 118. Crystallography and optical mineralogy, practical problems in field geology, the nature and identification of minerals in hand specimen and with the petrographic microscope. A grade of C- or better is required in this course before subsequent enrollment in geology courses is permitted. Lectures and two laboratories per week.

**GEOL 212 Petrology (4)**
Mr. Nelson. Prerequisite: GEOL 211. The origin and classification of igneous, sedimentary, and metamorphic rocks. Hand specimen identification and petrographic analysis of rocks. Lectures and two laboratories per week. Field trip.

**GEOL 288 Writing Practicum (1)**
Staff. Writing practicum. Fulfills the college writing requirement.
GEOL 306 Dinosaurs (3)

GEOL 340 Structural Geology (4)
Ms. Dawers. Prerequisites: GEOL 111, 211, PHYS 121 and 122, or PHYS 131 and 132, or approval of instructor. Geologic structures and mechanics of rock deformation; Tectonics; Interpretation of geologic maps and cross sections. Must register for GEOL 340-41 laboratory.

GEOL 388 Writing Practicum (1)
Staff. Writing practicum. Fulfills the college writing requirement.

GEOL 399 Field Geology (3-8)
Staff. Prerequisites: GEOL 212 and 340. The application of basic field methods to practical problems in field geology. When not offered by Tulane, students are required to complete this course at another college or university. Offered in the summer session only.

GEOL 422 Advanced Oceanography (3)
Mr. Bianchi. A broad survey of biological, chemical, physical, and geological oceanography with a brief historical overview and consideration of current concepts. There will also be an examination of biogeochemical relationships at macroscales, mesoscales, and microscales in the ocean. Same as EEOB 422.

GEOL 456, 457 Internship Studies (1-3, 1-3)
Staff. Prerequisites: approval of instructor and department. An experiential learning process coupled with pertinent academic course work. Open only to juniors and seniors in good standing. Registration is completed in the academic department sponsoring the internship on TUTOR. Only one internship may be completed per semester. (Note: A maximum of six credits may be earned in one or two courses.)

GEOL 491, 492 Independent Studies (1 or 3, 1 or 3)

GEOL H491, H492 Independent Studies (1 or 3, 1 or 3)

GEOL H499-H500 Honors Thesis (3, 4)

GEOL 603 Environmental Methods (3)
Mr. Flowers. Prerequisites: GEOL 403 and CHEM 108 or approval of instructor. A course to introduce laboratory and field methods necessary to the student interested in working in Environmental Geology. Lectures, laboratory, and field applications.

GEOL 604 Coastal Marine Geology (3)
Staff. Prerequisites: GEOL 111, 112, and college chemistry. Geomorphic features of estuarine, coastal, and continental shelf environments: erosional, depositional, and geochemical processes; field and laboratory methods; emphasis on dynamic coastal environments of the northern Gulf of Mexico. Offered summers only.

GEOL 607 Geological Problems (3)
Staff. For qualified students with departmental approval provided appropriate faculty director is available.

GEOL 608 Special Topics (3)
Staff. A special course taught by Tulane faculty or visiting faculty. The topic will be listed in the Schedule of Classes.

GEOL 609 Invertebrate Paleontology (4)
Mr. Parsley. Prerequisite: GEOL 112, EEOB 614, or approval of instructor. Principles of invertebrate paleontology; a systematic treatment of the fossil invertebrates and their living relatives. Emphasis on functional morphology, ontogeny, and paleoecology. Lectures, laboratory, field trip. Same as EEOB 609.

GEOL 610 Micropaleontology (3)
Staff. Prerequisite: GEOL 609 or elementary biology. The foraminifera, ostracoda, nanofossils, conodonts and other groups of microfossils. Lectures and laboratory. Same as EEOB 610.

GEOL 614 Igneous Petrology (3)
Mr. Nelson. Prerequisites: GEOL 212 and approval of instructor. An in-depth study of the origins of igneous rocks from the standpoint of experimental investigations, thermodynamics, trace elements, radiogenic isotopes, and field investigations. Lectures and laboratory.

GEOL 619 Marine Geology (3)
Staff. Prerequisite: GEOL 111 or 121. Survey of marine plate boundaries, ocean floor morphology, and paleoceanology and sedimentary history of the ocean basins and the ocean margins. Lectures

GEOL 620 General Geochemistry (3)
Mr. Flowers. Prerequisites: CHEM 107, 117, 108, 118, GEOL 211-212, and MATH 121-122. An introduction to the application of chemical principles to studying the Earth. Topics include the chemistry and evolution of the oceans and atmosphere, weathering and diagenesis, hydrothermal ore deposition, and metamorphic differentiation. Laboratory concerns phase equilibria and its graphic depiction. Lectures and laboratory.

621 Global Biogeochemical Cycles (3)
Mr. Bianchi. Prerequisite: one year of Organic Chemistry. An introduction to the global biogeochemical cycles in fresh water, marine, and terrestrial ecosystems. Emphasis will be placed on key environmental issues as they relate to perturbations of these global cycles. Open only to seniors and graduate students. Same as EEOB 621.

GEOL 625 Isotopes in the Environment (3)
Mr. Marcantonio. The use of isotopes as tools to trace the movement of air, water, and sediments through the atmosphere, hydrosphere, biosphere, and lithosphere. Same as EEOB 625.

GEOL 626 Paleoclimatology (3)
Mr. Marcantonio. Prerequisite: approval of instructor. Understanding past climatic variation is necessary to fully comprehend present and model future climate. The focus will be on climate change during the late Quaternary Period, with special emphasis on climate reconstruction methods. Same as EEOB 626.

GEOL 627 Sedimentation and Stratigraphy (3)
Mr. McKee. Prerequisite: GEOL 212. Composition, primary textures, and structures of sediments in major sedimentary environments. Environmental interpretation of ancient sedimentary sequences. The basic principles utilized in interpretation of the stratigraphic column. Lectures and laboratory which focuses primarily on methods of sedimentary analysis.

GEOL 629 Sedimentary Geochemistry (3)
Mr. McKee. Prerequisite: GEOL 627 or approval of instructor. Quantitative aspects of early sediment diagenesis. The topics examined include: sediment deposition, resuspension, bioturbation and accumulation; redox reactions; diffusion and desorption of dissolved species; and organic matter decomposition and storage. These basic concepts will be used to examine early diagenesis in a range of sedimentary environments.

GEOL 630 Groundwater Hydrology (3)
Mr. Flowers. Prerequisite: CHEM 107, 108, MATH 121, 122, or equivalent. Occurrence of water in the near-surface environment; saturated and unsaturated flow in aquifers; aquifer characterization; well hydraulics; and groundwater chemistry.

GEOL 632 Subsurface Geology (3)
Ms. Dawers. Prerequisite: senior standing or approval of instructor. Principles of subsurface mapping with emphasis on 3D seismic interpretation. Utilization of electric logs and other data to construct subsurface maps. Lectures and laboratory.

GEOL 634 The Earth (3)
Mr. Flowers, Mr. Nelson. Prerequisites: MATH 121 and 122, or equivalent, PHYS 121 and 122 or 131 and 132, and approval of instructor. Earth as seen in the light of solid-earth geophysics: age and origin; seismology and structure of the interior; gravity, geodesy, and the geoid; heat budget; generation of the magnetic field and paleomagnetism; and geophysical constraints on plate tectonics. Lectures.

GEOL 668 Volcanology (3)
Mr. Nelson. Prerequisite: approval of instructor. The study of volcanoes including volcanic landforms, eruptive mechanisms, and tectonic environments. Lectures.

GEOL 688 Writing Practicum (1)
Staff. Writing practicum. Fulfills the college writing requirement.