GEOLOGICAL SCIENCES

Dept. Code: GSC

Geological Sciences
Geological Sciences is concerned with Planet Earth, its origin, evolution, structure, internal and surface processes, mineral resources, environmental preservation, global dynamics, paleoclimate reconstruction, and life history. Geologists use their knowledge of chemistry, biology, physics, and mathematics to solve Earth problems.

Geological Sciences undergraduates are prepared for careers in industry as well as graduate study in geosciences, the environmental sciences, and marine sciences. Career paths include research and teaching, as well as employment in the petroleum and mineral industries and in industries and government organizations concerned with energy resources, geodynamics, the marine environment, conservation, and climate change.

Major Options
The Department of Geological Sciences offers three undergraduate degree options. Although a single major program, students often combine Geological Sciences with a second major in such diverse fields as, Marine Science, Mathematics, or Ecosystem Science and Policy. Interested students should read the information below and contact the Rosenstiel Undergraduate office (Ungar 210A or 305-284-2180) for details.

- Bachelor of Science (B.S.) in Geological Science
- Bachelor of Science (B.S.) Marine Science/Geological Sciences
- Bachelor of Arts (B.A.) in Geological Sciences
- Five-year Master of Science Program (M.S.)

5 Year B.S/M.S. Program in Geological Sciences and Marine Geosciences
A 5-year B.S./M.S. in Geological Sciences and Marine Geosciences allows qualified students to complete a master’s degree in one year of study beyond the B.S.

Both the B.S. degree in Geological Sciences and M.S. degree in Marine Geosciences are offered through the Department of Marine Geosciences in the Rosenstiel School

By the beginning of their junior year students should have obtained a graduate faculty advisor, selected an approved topic for research, and begun work on their senior thesis as preparation for the M.S. In the senior year, students will increase their focus on graduate courses and work closely with their graduate faculty advisor. Contact the Geological Sciences chair at the departmental office (305-284-4253) for more information.

GSC 101. Origin and Evolution of Planet Earth. 3 Credit Hours.
The origin of the elements and the evolution of the universe. The formation and early evolution of the solar system. The differentiation of the earth into core, mantle, and crust. Origin of the oceans and atmosphere.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

GSC 102. Evolution of the Biosphere. 3 Credit Hours.
The physical basis of life. The origin, early evolution, history of life on Earth. Emphasis on major crises and innovations, including the evolution of modern man.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 103. Evolution of the Modern Earth’s Environment. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 104. THE GLOBAL ENVIRONMENT. 3 Credit Hours.
Anthropogenic effects on the Earth’s environment compared to analogous natural events.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 105. THE GLOBAL ENVIRONMENT. 3 Credit Hours.
Anthropogenic effects on the Earth’s environment compared to analogous natural events.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

GSC 106. Geological Influences on Society. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 107. Natural Disasters - Hollywood Vs. Reality. 3 Credit Hours.
This course will explore the causes, effects and societal responses to disasters. We will look at a variety of natural hazards and related disasters including flooding, volcanoes, landslides, earthquakes, hurricanes, tsunami and drought. Using excerpted segments of “disaster films” in conjunction with scientific treatments, we can identify the causes, frequency, consequences, risks, and public perceptions of natural hazards.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

GSC 108. The Geologic Record. 3 Credit Hours.
Analysis of the rock record to determine the geologic history using knowledge of rocks, minerals, fossils, and stratigraphy.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

GSC 110. The Earth System. 3 Credit Hours.
Interactions among the major components of the Earth System - the geosphere, the hydrosphere, the atmosphere, and the biosphere. To be taken concurrently with GSC 114 lab section.
Corequisite: GSC 114.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.
GSC 110. Earth System History. 4 Credit Hours.
Earth History, beginning with earliest origins and surveying major steps in the evolution of the geosphere, atmosphere, hydrosphere, and biosphere. Components: LEC. Grading: GRD. Typically Offered: Fall & Spring.

GSC 114. Earth Processes Lab. 2 Credit Hours.

GSC 200. Environmental Statistics. 3 Credit Hours.
This introductory course provides an overview of parametric and nonparametric statistics with an emphasis on applications in the analysis of environmental data. Components: LEC. Grading: GRD. Typically Offered: Fall & Spring.

GSC 230. Reef Systems Through Time. 3 Credit Hours.
Interacting geological, physical, chemical, biological, and climatic processes that define a reefal setting and system. Field trips included. Components: LEC. Grading: GRD. Typically Offered: Spring.

GSC 231. Field Study of Reef Systems Through Time. 2 Credit Hours.

GSC 240. Introduction to Marine Geology. 3 Credit Hours.
Learn about the origin, structure and evolution of the ocean basins and their margins, including interpretation of the paleo-archives hidden on the seafloor. The course material is necessarily broad, covering marine geography, plate tectonics, active and passive margins, coastal and ocean processes, sediment processes, continental margin and seafloor resources, and climate and ocean history and interactions. Our approach will be interdisciplinary, requiring integration of chemical, physical and biological systems, as well as geologic processes. A special emphasis will be placed on learning to read the sediment record as an archive of information on biologic and climate evolution. Prerequisite: GSC 110 and GSC 114 or GSC 111. Components: LEC. Grading: GRD. Typically Offered: Spring.

GSC 260. Earth Materials. 4 Credit Hours.
Physical and optical properties of common rock-forming minerals and their occurrence in igneous, metamorphic, sedimentary rocks, and ore deposits. Lecture, 3 hours; laboratory, 4 hours. Components: LEC. Grading: GRD. Typically Offered: Fall.

GSC 309. Microbes and the Environment. 3 Credit Hours.
This course is designed to provide students in geology, biology and environmental science a fundamental understanding of the role microbes play in shaping the Earth and its environments as well as the basic principles and approaches to studying these interactions in both modern and ancient settings. The metabolic diversity displayed by microbial communities makes them an integral component of global elemental cycles. In this regard, microorganisms have shaped our planet over the past 4 billion years and continue to do so in a very prominent way. The goal of this course is to learn about microbial diversity and metabolism, and the ability of microbes to shape and influence the environment. Components: LEC. Grading: GRD. Typically Offered: Spring.

GSC 311. Field Study of Volcanoes and Society. 2 Credit Hours.

GSC 360. Depositional and Diagenetic Systems. 4 Credit Hours.
Sedimentary processes, sedimentology, and sedimentary diagenesis. Physical, biological and chemical sedimentation in Earth's surficial environments. Paleoenvironmental and diagenetic history reconstruction using petrologic, hand specimen, and field methods. Cyclicity in sedimentary systems. Lecture, 3 hours; field/laboratory, 3 hours. Components: LEC. Grading: GRD. Typically Offered: Fall.

GSC 380. Paleontology and Stratigraphy. 4 Credit Hours.
Biostratigraphy, paleoecology, taphonomy, micro- and macro-evolutionary processes, and physical and chemical methods used for stratigraphic correlation. Major groups of invertebrate phyla comprising the bulk of the fossil record. Lecture, 3 hours; laboratory, 2 hours. Components: LEC. Grading: GRD. Typically Offered: Spring.

GSC 400. Senior Internship. 3 Credit Hours.
Field and laboratory studies conducted in conjunction with an approved academic environmental or industrial research laboratory or agency. Components: THI. Grading: GRD. Typically Offered: Offered by Announcement Only.

GSC 410. Environmental Geochemistry. 3 Credit Hours.
Natural distribution of the elements on earth, and how this is being changed. Radioactivity and energy, greenhouse warming and ozone depletion, water and waste and other environmental problems. Components: LEC. Grading: GRD. Typically Offered: Fall & Spring.

GSC 420. Geophysics. 3 Credit Hours.
GSC 424. Origin and Geology of the Galapagos Islands. 3 Credit Hours.
This course explores the origin and geology of volcanic oceanic islands, using the Galapagos Islands as a natural laboratory. Though all share a common origin in plate tectonic theory, each island presents a host of environments that originate in the processes of volcanic action, erosion and hydrology. Individual islands therefore develop distinctive ecosystems within which organisms interact and evolve. The emphasis of this course will be to lay out the underlying geological processes that have led to the formation of the islands and to their present state, and to explore through daily field excursions a wide suite of volcanic features displayed on Isabela Island.
Prerequisite: GSC 110.
Components: LEC.
Typically Offered: Fall.
Grading: GRD.

GSC 470. Special Studies. 1-4 Credit Hours.
Students engaged in approved field and/or laboratory activities, such as work at sea or in the laboratory under supervision, may register for credit.
Components: LEC.
Typically Offered: Fall, Spring, & Summer.

GSC 490. Senior Thesis. 3 Credit Hours.
Individual, original research of independent study supervised by a member of the Departmental faculty and concluded by formal thesis preparation, public oral defense and submission of the thesis to the Department.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 491. Senior Thesis. 3 Credit Hours.
Individual, original research of independent study supervised by a member of the Departmental faculty and concluded by formal thesis preparation, public oral defense and submission of the thesis to the Department.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

GSC 550. Hydrogeology. 3 Credit Hours.
Movement of subterranean water. The mechanical, chemical and thermal interaction of water with porous solids, and the transport of energy and chemical constituents. The origin of porosity and permeability. The controls exerted on aquifers by the lithology, stratigraphy and structure of geologic deposits and formations.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

GSC 560. Colloquium - Current Topics in the Geosciences. 1 Credit Hour.
Weekly presentations and discussions. Written and oral presentations required.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

GSC 561. Colloquium - Current Topics in the Geosciences. 1 Credit Hour.
Weekly presentations and discussions. Written and oral presentations required.
Components: DIS.
Grading: GRD.
Typically Offered: Spring.
GSC 581. Summer Field Environmental Geology. 2 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Spring & Summer.

GSC 582. Field Studies. 1-4 Credit Hours.
Conducted field trips to selected geological sites in the United States and abroad. Report required.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

GSC 596. Research in Geology. 1-4 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.