**Geosciences Course Descriptions**

**GEOS 1103 (GEOL 1103) Physical Geology Laboratory** (1 semester hour) A laboratory to accompany GEOS 1303. The exercises include mineral and rock identification. Topographic maps, geologic maps, and aerial photographs are used to study surface landforms, geologic phenomena and tectonic processes. GEOS 1303 is a corequisite or prerequisite. (0-3) S

**GEOS 1104 Earth History Laboratory** (1 semester hour) A laboratory to accompany GEOS 1304. Exercises include: fossil identification, stratigraphy and correlation, the geologic time scale, age-determination techniques, and maps. (0-3) Y

**GEOS 1303 (GEOL 1303) Physical Geology** (3 semester hours) Introduction to the Earth as a unique planet. The course investigates minerals and rocks which make up the Earth. The structure of the Earth and dynamics of its internal mechanisms are explored. Plate tectonics and surface processes which sculpt the Earth are the topic of the second half of the course. Other planets and celestial bodies within the solar system are contrasted with Earth. Field trip. (3-0) S

**GEOS 1304 Introduction to Earth History** (3 semester hours) Introduction to the history of the Earth. The history of life and an introduction to the principles of paleontology, stratigraphy and global change will be discussed. All topics will be discussed in the context of the tectonic evolution of North America. Field trip. Prerequisite: GEOS 1303 and GEOS 1103. (3-0) Y

**GEOS 2302 The Global Environment** (3 semester hours) An introduction to the physical aspects of the world's geography, emphasizing the interrelationships between the Earth and its climate, vegetation, soils, and landforms. Provides a global perspective on the physical environment and the interactions between global systems to produce regional differences (Same as GEOG 2302). (3-0) Y

**GEOS 2407 Field Geology I** (4 semester hours) Geologic field techniques. Field trips. Prerequisites: GEOS 1303 and 1103; GEOS 2409 recommended. (4-0) Y

**GEOS 2409 (GEOL 2409) Rocks and Minerals** (4 semester hours) Introduction to crystallography, mineralogy, and petrography. Laboratory course. Prerequisites: GEOS 1303 and 1103 (may be taken concurrently). (3-3) Y

**GEOS 2410 Gemstones** (4 semester hours) Minerals and rocks used as gemstones; their characteristics, physical properties; geological settings and extraction from the earth; and lore and history of use. Laboratory component involves gemstone identification and analysis. (3-3) Y

**GEOS 2V08 Special Topics in Geology or Geophysics** (1-4 semester hours) Subject matter will vary from semester to semester. Consent of instructor required. May be repeated for credit. (9 hour maximum). ([1-4]-0) R

**GEOS 2V95 Individual Instruction in Geosciences** (1-6 semester hours) Individual study under a faculty member's direction. May be repeated for credit. Consent of instructor required. ([1-6]-0) R

**GEOS 3101** One hour courses designed to provide an introduction to scientific topics of general interest. Each course will last approximately 1 month during a semester. There are no pre-requisites. Students may enroll in each course individually. Up to 3 courses may be taken in one semester. Current topics include (other courses may be introduced): Y

- **Coral Reefs** (1 semester hour) This course examines the biology, chemistry, and geology associated with modern and ancient reef building corals. Human impact on this fragile ecosystem and the role that coral reefs play in global warming are explored. (1-0)
- **Deserts, Dunes, and Dust** (1 semester hour) A study of the the climatology, location, and formation of the deserts of the world. The unique landforms found in the desert are described with special emphasis on sand dunes and the role of dust in the geologic record. (1-0)
- **Geologic Time** (1 semester hour) This course explores the development of scientific thought concerning the age of the earth and the solar system, beginning with theological based ideas of the 16th and 17th century and concluding with isotopic age determination of the 20th century. (1-0)
- **Geologic Controversies** (1 semester hour) This course examines the geological aspects of the scientific refutation of creationism. A review of critical court cases will serve as the focus of discussion. (1-0)
- **Glaciers** (1 semester hour) An introduction to the formation and development of glaciers from the high mountains to Poles. A review of past glaciations through geologic time to the present, ending with a discussion of the causes of glaciation. (1-0)
- **Global Climate Change** (1 semester hour) This course focuses on the present climate system of Earth, glacial cycles of the past, and potential problems such as ozone depletion and greenhouse warming. (1-0)
Gems of the World (1 semester hour) This course focuses on some minerals used as gemstones and discusses their characteristics, lore, history, intrigue, and geological settings. (1-0)

GEOS 3110 Environmental Geology Lab (1 semester hour) Field observation and measurement of processes and phenomena in environmental geology. Activities include stream and groundwater flow and chemistry measurements, hydrogeologic mapping, and environmental site assessment. Most class meetings are outdoors. GEOS 3310 is a corequisite or prerequisite. (0-3) Y

GEOS 3132 Age of Dinosaurs Lab (1 semester hour) Hands-on activities that include biological classification, form and analyses of bones, calculations of dinosaur mass, calculations of speed from fossil trackways, assembling a horse or a cow, and building your own sauropod dinosaur from chicken bones. The course has no pre- or co-requisites but is meant to accompany GEOS 3332 Age of Dinosaurs lecture course. (0-3) Y

GEOS 3310 Environmental Geology (3 semester hours) A self-paced course examining the interactions of people and our physical environment. Natural hazards, including landslides, flooding, tsunamis, volcanoes, earthquakes, erosion and sea-level change. Air, soil, fresh and ocean water pollution problems and solutions including greenhouse gases, ozone depletion, acid rain, aquifer depletion, toxic wastes and contamination. Energy supplies and the environment, including radioactive waste problems, and human impacts on climate. No prerequisites. (3-0) Y

GEOS 3313 Weathering and Soils (3 semester hours) An introduction to the processes of chemical and physical weathering of Earth materials to form soils. A discussion of soil types and soil classification. Short field trips and some laboratory analyses of soil textures. (3-0) R

GEOS 3315 Geomorphology (3 semester hours) An introduction to the processes that shape landscape evolution. Map and aerial photographic study of examples of various types of landforms with emphasis on the landforms of the U.S. Prerequisite: GEOS 1103 and 1303. (3-0) R

GEOS 3332 Age of Dinosaurs (3 semester hours) Introductory survey of the anatomy, physiology, life-styles, population, and evolution of dinosaurs and swimming and flying reptiles, as well as Mesozoic climates and basic Earth history of the "Age of Dinosaurs". One three- or four-day field trip to dig dinosaurs in the Big Bend area of Texas. No prerequisites. (3-0) Y

GEOS 3350 Global Change (3 semester hours) An examination of the Earth as a system of interacting spheres - water, air, land and life - and the energy that drives these systems; global changes that have occurred on Earth in the past (e.g., ice ages, mass extinctions) and are happening now and in the future (e.g., greenhouse warming, ozone depletion); how the presence of life has modified the planet. (3-0) Y

GEOS 3401 Oceanography (4 semester hours) Fundamentals of oceanography, with discussions on the effects of the oceans and people on the Earth's climate and biological communities. Topics include the formation of ocean currents, waves and tides, the greenhouse effect, El Niño, marine pollution, the exploitation of marine resources, wetlands preservation, coral reefs, life in the deep sea, and other marine ecological systems. Laboratory course. Field trip. Enrollment in GEOS 3401 precludes enrollment in ISNS 3367 The Oceans. (3-3) R

GEOS 3421 Stratigraphy and Sedimentology (4 semester hours) Principles and evolution of modern stratigraphic nomenclature; concepts of space and time in the rock record and methods of stratigraphic correlation; factors controlling stratigraphic architecture of sedimentary basins; integrated stratigraphic techniques. Origin, transportation, and deposition of carbonate and siliciclastic sediments; weathering, textural analysis, and depositional environments. Laboratory course. Field trips. Prerequisites GEOS 1304, 1104, and 2409 (3-3) Y

GEOS 3430 Invertebrate Paleontology (4 semester hours) Studies in the morphology, evolution, classification, and paleoecology of invertebrates important in the fossil record. Laboratory course. Field trip. GEOS 1304 and 1104 recommended (2-6) Y

GEOS 3432 Introduction to Fossils (4 semester hours) Introduction to the study of invertebrate fossils occurring in Cretaceous sedimentary strata in North Texas. "Hands on" approach to the study of invertebrate macrofossils and microfossils includes learning how to (1) collect fossils at selected outcrops in the field; (2) process samples for fossils in the laboratory; (3) illustrate microfossils using the scanning electron microscope; and (4) identify fossils using the available paleontological literature. Both lectures and laboratory exercises will focus on the invertebrate phyla occurring in selected North Texas Cretaceous outcrops. Laboratory and field trip course. Not available to students who have taken, or are taking, GEOS 3430. (3-3) Y

GEOS 3461 Optical Mineralogy (4 semester hours) Principles of optical mineralogy and an introduction to the study of
rocks in thin section. Laboratory course. Prerequisites: GEOS 2409; PHYS 2326 and 2126 strongly recommended. (2-6) Y

GEOS 3463 Petrology (4 semester hours) Study of the origin and composition of igneous, metamorphic, and sedimentary rocks, with an emphasis on microscopic description and interpretation. Laboratory course. Field Trips. Prerequisite: GEOS 3461 (2-6) Y

GEOS 3470 Structural Geology (4 semester hours) Modern tectonic concepts, survey of major structural provinces, examination of material behavior, stress-strain concepts, failure criteria, soil mechanics, fault analysis, rheology, fold analysis and applications of structural concepts to neotectonics and environmental problems. Training in graphical techniques, use of stereographic projections, and geological map interpretation. Laboratory course. Field trip. PHYS 2325 and 2125 strongly recommended (3-3) Y

GEOS 3480 Introduction to Geophysics (4 semester hours) Introduction to physics of the solid Earth. The nature of gravitational, magnetic, thermal and seismic phenomena and their application to our understanding of the internal structure, origin and dynamics of the planet, including plate tectonics. The principles of geophysical methods and data analysis will form the basis of small scale field exercises in the Dallas area. Laboratory course. Prerequisites: PHYS 2325, 2125, 2326, and 2126 or permission of instructor. (3-3) Y

GEOS 4301 Geologic Environment of the Metroplex (3 semester hours) Introduction to the local geologic environment, with emphasis on sedimentary formations of the greater Dallas-Fort Worth Metropolitan area and what these deposits tell us about the sequence of events happening in the region over the past several hundred million years. Prerequisite: GEOS 1303 Physical Geology. Five 1-day (Saturday) field trips. (3-0) R

GEOS 4304 GEOSciences Field Trip (3 semester hours) A study of the geology of a selected region within North America and Caribbean, followed by a 10- to 14-day field trip to the selected region in order to study the field relationships of geologic features within that region. Field trip. Consent of instructor required. (3-0) R

GEOS 4310 Fundamentals of Hydrogeology (3 semester hours) Principles of fluid migration in the Earth’s crust; groundwater flow, hydrologic models, single and multiphase contaminant migration, fracture system hydrology; training in data analysis, presentation and basic numerical modeling techniques. (3-0) R

GEOS 4350 Principles of Geochemistry (3 semester hours) Applications of chemistry to understanding the earth and geochemical cycles. Topics include composition of the earth and the solar system, evolution of the hydrosphere and behavior of low-temperature aqueous solutions, formation of hydrocarbons, chemical changes accompanying diagenesis and evolution of high temperature silicate melts. Introduction to isotope geochemistry. Prerequisite: CHEM 1311, 1111, 1312, and 1112. (3-0) R

GEOS 4399 Senior Honors in GEOSciences (3 semester hours) For students conducting independent research for honors theses or projects. (3-0) R

GEOS 4606 Field Geology II (Summer Field Camp) (6 semester hours) A four-week summer camp designed to provide both practical geological and geophysical experience. Geology students emphasize mapping in sedimentary, igneous, and metamorphic terrains. Geophysics students utilize seismic, potential field, and electrical methods to analyze a field area. Reports in professional form are required. Prerequisites: GEOS 2407, 3421, 3470. NOTE: A field-trip fee is charged for this course. Students are responsible for all personal expenses related to camp. (6-0) Y

GEOS 4V08 Special Topics in Geology or Geophysics (1-4 semester hours) Subject matter will vary from semester to semester. Consent of instructor required. May be repeated for credit (9 hours maximum). [(1-4)-0] R

GEOS 4V09 Senior Research in Geology (1-9 semester hours) May be repeated for credit. No more than 3 hours of senior research may be used to satisfy the upper-division course work requirement in the major unless approved in advance by the undergraduate advisor. [(1-9)-0] S

GEOS 4V80 Senior Research in Geophysics (1-9 semester hours) May be repeated for credit. No more than 3 hours of senior research may be used to satisfy the upper-division course work requirement in the major unless approved in advance by the undergraduate advisor. [(1-9)-0] S

Interdisciplinary Studies Courses Applicable to the B.A. in Geosciences

Students electing the B.A. program in Geosciences may take one of the following university-wide Interdisciplinary Studies courses as a Geosciences elective.