

# Geosciences

**[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. Pre- or corequisite: [GEOS 1303](#). (0-3) S

**[GEOS 1104](#) ([GEOL 1104](#)) History of Earth and Life Laboratory** (1 semester hour) A laboratory to accompany [GEOS 1304](#). Exercises include fossil identification, stratigraphy and correlation, the geologic time scale, and determination techniques, and maps. Pre- or corequisite: [GEOS 1304](#). (0-3) Y

**[GEOS 1303](#) ([GEOL 1303](#)) Physical Geology** (3 semester hours) Introduction to the Earth as a unique planet. This course investigates minerals and rocks which make up the Earth. The structure of the Earth and dynamic internal mechanisms are explored. Plate tectonics and surface processes which sculpt the Earth are the focus in 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](#) ([GEOL 1304](#)) History of Earth and Life** (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. Prerequisites: [GEOS 1303](#) and [GEOS 1103](#). (3-0) Y

**[GEOS 2302](#) ([GEOL 1305](#)) 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 geospheric systems to produce regional differences. (Same as [GEOG 2302](#)) (3-0) T

**[GEOS 2306](#) Geodesy and Geospatial Analysis** (3 semester hours) Introduction to the basic concepts of geodesy, datums (horizontal and vertical), coordinate systems and map projections. Applications in the Earth Sciences will be discussed to reinforce concepts. (Same as [GISC 2302](#)) (3-0) Y

**[GEOS 2406](#) Geospatial Science and Methods** (4 semester hours) Remote sensing and Geographic Information System (GIS) science and methods as applied to geospatial aspects of geosciences. Introduction to geospatial software in geosciences. Prerequisites: [GEOS 1303](#) and [GEOS 1103](#). Recommended prerequisite: [GEOG 2302](#). (4-0) Y

**[GEOS 2409](#) ([GEOL 2409](#)) Rocks and Minerals** (4 semester hours) Introduction to crystallography, mineralogy, and petrography. Laboratory course. Pre- or corequisites: [GEOS 1303](#) and [GEOS 1103](#). (3-3) Y

**[GEOS 2v08](#) Special Topics in Geology or Geophysics** (1-4 semester hours) Subject matter will vary from semester to semester. Instructor consent required. May be repeated for credit as topics vary (9 hours maximum). ([1-4]-0) R

**[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. (0-3) Y

**[GEOS 3121](#)** **The Biosphere: Origin, Evolution and Mass Extinctions** (1 semester hour) This course presents an overview of the significant events in the history of life on Earth, how the presence of life has modified the environment, and the catastrophic events that have caused mass extinctions of organisms. The course will last approximately 1 month during a semester. (1-0) Y

**[GEOS 3122](#)** **Coal in Our Society** (1 semester hour) Coal plays an important role in the U.S. energy mix and has a critical role in Texas society. Yet it may be the most misunderstood natural resource. It is the objective of this course to familiarize the students with the origin, properties, and uses of coal and examine how coal use impacts the environment and human health. This will be accomplished by exploring the facts and fallacies surrounding coal in our society. There will be a field trip to a coal mine and/or a coal-burning power plant. The course will last approximately 1 month during a semester. (1-0) Y

**[GEOS 3123](#)** **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. The course will last approximately 1 month during a semester. (1-0) Y

**[GEOS 3124](#)** **Geology and Human Health** (1 semester hour) Introduction to the impacts of geologic materials and geologic processes on animal and human health. Examples will focus primarily on how geologic materials (minerals, soil, natural dust and uncontaminated water) and geologic processes, such as volcanoes and earthquakes, are impacting human health. The course will last approximately 1 month during a semester.

**[GEOS 3125](#)** **Global Climate Change** (1 semester hour) This course focuses on the present climate system on Earth, glacial cycles of the past and potential problems, such as ozone depletion and greenhouse warming. The course will last approximately 1 month during a semester. (1-0) Y

**[GEOS 3126](#)** **The Evolution Debate** (1 semester hour) The theory of evolution and the origin of life problem. Supporting evidence from the fossil record, molecular biology and DNA. Creationism, intelligent design and pseudoscience. The course will last approximately 1 month during a semester. (1-0) Y

**[GEOS 3127](#)** **Forensic Geology** (1 semester hour) Police and forensic scientists have long used mineralogical and geochemical analytical information and techniques, geologic databases, maps, and insights to solve a wide range of crimes and mysteries. This course will provide the students with fundamental knowledge of how geosciences can be used to augment the tools available to criminal investigators. Case studies will be used to illustrate how geoscience tools and techniques have been used to solve crimes. (0-1) Y

**[GEOS 3128](#)** **Geologic Time** (1 semester hour) Notions of immortality and concepts of eternity--the struggle to understand human existence and the physical world. The geocentric universe--a Graeco-Christian cosmology. The Renaissance and the slow acceptance of the Copernican universe. James Hutton's Earth machine and William Smith's strata--the progeny of the Enlightenment and the Industrial Revolution. Biostratigraphy, the stratigraphers and Victorian reaction to the realization of Earth's antiquity. Lord Kelvin's arguments for a young Earth. Discovery of radioactivity and the refutation of Kelvin. Patterson and the age of the solar system. Modern rock dating techniques. A walk through geologic time. (0-1) Y

**[GEOS 3300](#)** **Field Geology I (Summer Field Camp I)** (3 semester hours) A three-week, early summer field course designed to provide practical introductory field geological experience. Course emphasizes mapping sedimentary and igneous terrains and will also cover techniques for mapping geomorphic features. Reports on each project in professional form are required. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), [GEOS 2406](#). NOTE: A field trip fee, which covers the cost of food, lodging, and transportation, is charged for this course. Students are responsible for any other personal expenses related to camp. (3-0) Y

[GEOS 3310 Environmental Geology](#) (3 semester hours) A course examining the interactions of people and the 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. (3-0)

[GEOS 3321 Geology, Resources, and Environment of Latin America](#) (3 semester hours) An overview of the physical environment of Mexico, Central America, and South America. Topics include evolution of Latin American crust and continent; location and formation of major geologic resources and physiographic features; resource exploitation and present environmental problems with an historic perspective. (3-0) R

[GEOS 3401 Oceanography](#) (4 semester hours) Fundamentals of oceanography, with discussions on the interactions 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 Nino, marine pollution, the exploitation of marine resources, wetlands preservation, coral reefs, life in the deep sea, and other marine ecological systems. Laboratory course. Can receive credit for only one of [GEOS 3401](#) or [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 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), and [GEOS 2409](#). (3-3) 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. (3-3) Y

[GEOS 3434 Paleobiology](#) (4 semester hours) History of life as documented by the fossil record. Basic concepts of paleontology and biostratigraphy followed by a review of major fossil groups and major events in the evolution of life, speciation, mass extinction, evolution of communities and ecosystems through geologic time. Paleontological methods to paleoenvironmental reconstruction. Field trip. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), and [GEOS 2409](#). (3-3) Y

[GEOS 3464 Igneous and Metamorphic Petrography](#) (4 semester hours) Introduction to the petrographic microscope and its use for study of igneous and metamorphic minerals and rocks. Identification and classification of volcanic and plutonic igneous rocks and metamorphic rocks and their identification in thin sections. Introduction to igneous and metamorphic petrogenesis. Prerequisites: [GEOS 1303](#), [GEOS 1103](#), [GEOS 1104](#), and [GEOS 2409](#). (3-3) 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 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. (3-3) Y

course. Field trip. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), [GEOS 2409](#) and [GEOS 2406](#). Recommended prerequisites: [PHYS 2325](#) and [PHYS 2125](#). (3-3) Y

[GEOS 4300](#) **Field Geology II (Summer Field Camp II)** (3 semester hours) A three-week, early summer field-based course designed to provide practical advanced field geological experience. Course emphasizes mapping in sedimentary, metamorphic, and igneous terrains and will also cover techniques used in imaging and analyzing geomorphic features. Reports on each project in professional form are required. Prerequisites: [GEOS 3300](#), [GEOS 3421](#), [GEOS 3464](#), [GEOS 3470](#). NOTE: A field trip fee, which covers the cost of food, lodging, and transportation, is charged for this course. Students are responsible for all personal expenses related to camp. (3-0) Y

[GEOS 4320](#) **The Physics and Chemistry of the Solid Earth** (3 semester hours) The study of the structure and evolution of the Earth through petrology, geochemistry and geophysics. Plate tectonics will be emphasized in the framework for crust and mantle dynamics. The roles of gravity, thermal processes and the mechanical behavior of rocks are investigated. Tectonic settings of igneous and metamorphic rocks will be explored. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), [GEOS 2409](#), and [GEOS 3464](#). Recommended prerequisites: [PHYS 2125](#) and [PHYS 2325](#). (3-0) Y

[GEOS 4322](#) **The Earth System** (3 semester hours) Planet Earth comprises a system of interacting spheres: atmosphere, hydrosphere, lithosphere and biosphere, all of which have played an important role in Earth's processes and Earth history. This course examines these Earth systems and how their interactions over time have affected their evolving compositions, the evolution of life and Earth's climate. The short-term and long-term parts of the carbon cycle provide the underlying theme for the study of the Earth System. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), and [GEOS 2409](#). (3-0) Y

[GEOS 4390](#) **Senior Research and Advanced Writing** (3 semester hours) For students conducting independent research and scientific writing in Geosciences. Subject and scope to be determined on an individual basis. Satisfies the Advanced Writing Requirement for Geoscience majors. Prerequisites: Instructor consent required and senior level standing in Geosciences. (3-0) S

[GEOS 4395](#) **Satellite Geophysics and Applications** (3 semester hours) This course concerns both the theory and application of observing geophysical fields from space-borne platforms. The observation procedures including orbital mechanics are introduced and signal propagation, errors and uncertainties will be addressed. Current satellite missions such as radar and laser altimetry, space gravimetry and magnetometry, and synthetic aperture radar will be discussed. Applications of satellite geophysical observations in tectonics, geodynamics, ocean and ice surface monitoring, hydrology, and terrain modeling will be introduced through student projects and presentations. (3-0) Y

[GEOS 4399](#) **Senior Honors in Geosciences** (3 semester hours) For students conducting independent research for honors theses or projects. Satisfies advanced writing requirement. (3-0) R

[GEOS 4430](#) **Hydrogeology and Aqueous Geochemistry** (4 semester hours) An introduction to the principles of physical and chemical hydrogeology. Physical topics include the nature and quantification of the components of the hydrologic cycle, fundamentals of water supply and quality, overview of aquifer testing and environmental assessment. Chemical topics include behavior of low-temperature aqueous solutions, water-rock interactions, and applications of chemistry to understand the Earth and its geochemical cycles. Prerequisites: [GEOS 1103](#), [GEOS 1104](#), [GEOS 1303](#), [GEOS 1304](#), and [GEOS 2409](#). Recommended prerequisites: [CHEM 1311](#) and [CHEM 1312](#). (4-0) Y

**[GEOS 4606](#) Field Geology (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 1103](#), [1304](#), [1104](#), [2409](#) and [GEOS 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. Instructor consent required. May be repeated for credit as topics vary (9 hours max) ([1-4]-0) R

**[GEOS 4v09](#) Senior Research in Geology** (1-6 semester hours) Topics may vary. May be repeated for credit. No more than 3 hours of senior research may be used to satisfy the upper-division course work requirement for the major unless approved in advance by the undergraduate advisor. Prerequisite: Instructor consent required. ([1-6]-0) S

**[GEOS 4v80](#) Senior Research in Geophysics** (1-6 semester hours) Topics may vary. May be repeated for credit. No more than 3 hours of senior research may be used to satisfy the upper-division course work requirement for the major unless approved in advance by the undergraduate advisor. Prerequisite: Instructor consent required. ([1-6]-0) S

Updated: April 6, 2014 - Visitor: 735