

Undergraduate Geology Courses

GEOL 1100. Transitioning to University Studies in Geosciences. 1 Credit Hour (Lecture: 1 Hour, Lab: 1 Hour).

An introduction to geosciences, including earth science, environmental science, geology, hydrogeology, and petroleum geology. Practical study designed to prepare the geoscience student for university life, aid in the development of skills for academic success, promote personal growth and responsibility, and encourage active involvement in the learning process.

GEOL 1403. Physical Geology. 4 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

An introduction to the physical processes that operate in and on the planet Earth. Topics of discussion include: the Earth's structure, rocks and minerals, volcanoes, earthquakes, groundwater, rivers, glaciers, and deserts. Lab fee: \$2.

GEOL 1404. Historical Geology. 4 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

History of the Earth from the formation of the solar system to the present. Topics include the Earth's development, evolution of life on Earth, changes in the Earth's geography throughout its history, and the tools geologists use to investigate these topics. Lab fee: \$10.

GEOL 1407. Introduction to Environmental Science. 4 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

Introduction to the study of the environment. The course will examine air, water, and soil pollution, and pollution remediation. Energy, mineral resources, and land use will be studied. The course will also emphasize a study of the water supply, water use, and water management. Much of the laboratory will focus on land use planning and environmental pollution remediation. Lab fee: \$2.

GEOL 1408. Natural Disasters. 4 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

Course focuses on the causes, effects, and mitigation of natural disasters around the world. Topics covered will include: plate tectonics, earthquakes, volcanoes, tsunamis, landslides, meteor impacts, climate change, and major weather events such as tornadoes, floods, and hurricanes. Emphasis will be on methods used by scientists to monitor and study these natural phenomena, as well as the economic and societal impact of and response to the events. Lab fee: \$2.

GEOL 3310. Geomorphology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Study of surface processes in geological environments with emphasis on environmental and engineering applications. Topics include weathering, soil formation and erosion, landslides, and landforms associated with rivers, groundwater, coasts, arid and semi-arid climates. Laboratory emphasizes aerial photo and topographic map interpretation. Prerequisite: GEOL 1403. Lab fee: \$10.

GEOL 3314. Geochemistry. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

A survey of the application of chemical principles to problems of geology. Topics include the origin and distribution of the elements and exploration of the behavior and distribution of various elements in igneous, metamorphic, and sedimentary rocks. Basic concepts of thermodynamics, solution chemistry, and isotope geochemistry will be discussed. Credit for both GEOL 3314 and CHEM 3314 will not be awarded. Prerequisites: CHEM 1312 and 1112. Lab fee: \$2.

GEOL 3320. Hydrogeology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Aquifer characteristics, physical principles of groundwater flow, well analysis, geologic controls on local and regional groundwater movement, water chemistry, groundwater pollution, legal issues in groundwater. Prerequisites: GEOL 1403, CHEM 1312 and 1112, and either MATH 1316, or MATH 2412, or MATH 2413, or approval of department head. Lab fee: \$2.

GEOL 3400. Crystallography and Mineralogy. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

A study of the basic crystallographic forms, some of the common ore and rock forming minerals. An introduction to Optical Mineralogy. Prerequisite: GEOL 1403. Lab fee: \$2.

GEOL 3405. Paleontology. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

An introduction to the study of fossils. A survey of the systematics, evolution and paleoecology of microfossils and important macrofossil groups. Prerequisite: GEOL 1403, GEOL 1404 Lab fee: \$2.

GEOL 3406. Igneous and Metamorphic Petrology. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

An introduction to the origin, characteristics, and associations of igneous and metamorphic rocks. Introduction to igneous phase diagrams and metamorphic phase equilibria. Prerequisites: CHEM 1311 and 1111, 1312 and 1112, GEOL 1403, MATH 1314 or higher.

GEOL 3412. Structural Geology. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

A study of the forces and processes resulting in the deformation of and structural features of units in the Earth's crust. Lab work includes solution of problems by descriptive geometry, geologic and topographic maps and cross-sections. Prerequisites: GEOL 1403 and GEOL 1404 Lab fee: \$2.

GEOL 3413. Stratigraphy and Sedimentology. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

A study of the origin, transportation, and deposition of sediments and the formation of sedimentary rocks. Emphasis on the study of strata and depositional systems and the utilization of sedimentology and stratigraphy in economic geology, environmental geology, hydrogeology and petroleum geology. Prerequisite: GEOL 1403 Lab fee: \$2.

GEOL 4086. Problems. 1-3 Credit Hours (Lecture: 0 Hours, Lab: 1-3 Hours).

A course open to capable Geology and Earth Science students. Topics may vary according to student need. May be repeated for credit, subject to the approval of the department head. Prerequisite: Junior classification and approval of department head.

GEOL 4305. Field Geology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

An introduction to the identification and interpretation of rocks and geological structures in the field. Field and laboratory activities include rock identification and interpretation, surveying with plane table and alidade, measuring and describing geological sections and field mapping with Brunton compass, air photos, and topographic maps. Prerequisite: GEOL 1403, and 6 hrs upper level GEOL. Lab fee \$2.

GEOL 4311. Economic Geology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

An introduction to the origin, classification, uses, and economics of metallic and nonmetallic mineral deposits. Lab will introduce reflected light microscopy, alteration petrology and simulate a complete mineral deposit exploration program. Prerequisite: GEOL 3406 or concurrent enrollment. Lab fee: \$10.

GEOL 4312. Petroleum and Subsurface Geology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Origin and distribution of petroleum. Geochemistry and maturation of organic matter; microbiological and thermal degradation of hydrocarbons, conventional and unconventional petroleum systems; principles of primary and secondary migration; seals; hydrocarbon traps, diagenesis of carbonate and clastic reservoir rocks; use of subsurface geologic data to prepare maps and identify prospects. Prerequisite: GEOL 3312, 3413. Lab fee: \$2.

GEOL 4315. Sedimentary Petrology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Introduction to the physical, chemical, and biologic properties of sedimentary rocks, as revealed by petrographic microscopy, geochemical techniques, and field study. Emphasis is placed on the mineralogy, chemistry, textures, and sedimentary structures that characterize sedimentary rocks, and the relation of these features to their depositional origin and subsequent diagenesis. Prerequisites: GEOL 1403 and GEOL 3413 Lab fee: \$2.

GEOL 4316. Well Log Analysis. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Petrophysics and modern well-logging methods. Theory and applications of measurements of physical properties of the formation near the well bore, types of well logging tools, interpretation and use of well log information in petroleum exploration and development. Prerequisite: GEOL 3413 Lab fee: \$2.

GEOL 4317. Seismic Interpretation. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

Examination of seismic interpretation methods with emphasis on the petroleum industry. Topics include basic reflection theory, seismic acquisition and processing (prestack and poststack), incorporation of well data, picking and mapping horizons, structural interpretation, seismic stratigraphy, advanced seismic interpretation techniques, Direct Hydrocarbon Indicator (DHI), and depth conversion. Hands-on interpretation using standard industry software. Prerequisite: GEOL 3312, GEOL 3413. Lab fee: \$2.

GEOL 4318. Plate Tectonics. 3 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

Plate Tectonics is the unifying theory in modern geology. This course will examine the driving mechanisms of crustal deformation, geophysical and geologic data supporting sea-floor spreading and plate motions, and major type of plate boundaries. We will explore implications of plate tectonics, continental drift, and mountain building, the role of plate tectonic cycle in renewal of Earth's surface, and relation with other geochemical cycles. Readings from original papers. Prerequisite: GEOL 1403, GEOL 3413, Geol 3312 Lab fee: \$2.

GEOL 4320. Paleoeecology. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).

The ecology of ancient life. The course will focus on defining and identifying community structures through time, exploring the rise and fall of communities and the changing populations within them. Emphasis will be on field and hand-sample identification of community affinities based on sediments and life habit. Prerequisite: GEOL 1404, GEOL 3405, GEOL 3413 Lab fee: \$2.

GEOL 4600. Field Camp. 6 Credit Hours (Lecture: 0 Hours, Lab: 12 Hours).

Field course practicing field application of geological techniques. Locations visited and material covered vary by year and host institution. Methods practiced include: field mapping, data collection, measurement of sections, and geologic reporting. Prerequisite: Vary by institution. Lab fee: \$2.