

GEOLOGY (GEOL)

GEOL 5101 Geology Seminar

1 Semester Credit Hour (1 Lecture Hour)

An examination of concepts and theories in geology and their linkages to other disciplines such as environmental science, computer science, geographic information science, and education. Seminar themes may vary from year to year. May be repeated for credit but credit may be applied only once towards degree.

GEOL 5308 Coastal Geoenvironments and Change

3 Semester Credit Hours (3 Lecture Hours)

Investigations of the origin, character, and processes of coastal geoenvironments with an emphasis on tracking historical and projecting future changes. Involves examination of the interactions of geological and biological processes and impacts of human activities on coastal depositional systems. Includes applications of remote sensing, ground studies, and GIS for mapping geoenvironments and analyzing change. Readings in current literature, day field trips, and a project.

GEOL 5321 Advanced Soil and Groundwater

3 Semester Credit Hours (3 Lecture Hours)

Advanced study of methods for restoring contaminated soil and groundwater by examining the factors and processes influencing the efficacy of remediation systems. An emphasis will be placed on the scientific principles upon which soil and groundwater remediation is based.

GEOL 5322 Advanced Geophysical Techniques Seminar

3 Semester Credit Hours (3 Lecture Hours)

This graduate-level course is for coastal and marine system science and environmental science majors and professional petroleum geologists who would like a better understanding of advanced geophysical techniques and principles available to geoscientist working subsurface problems. The course will consist of an examination of current topics, techniques, and software. New techniques and topics will be presented by geology staff and visiting experts working in those fields.

Prerequisite: GEOL 4411 and 4422.

GEOL 5336 Groundwater Geochemistry

3 Semester Credit Hours (3 Lecture Hours)

Principles of the geochemistry of groundwater including chemical thermodynamics. Characterization of the chemistry of natural and contaminated groundwater. Chemical measurements, analyses, and calculations. Includes readings in current literature and research on a selected topic.

Prerequisite: GEOL 4444.

GEOL 5437 Computer Applications and Modeling in Hydrogeology

4 Semester Credit Hours (4 Lecture Hours)

Principles of analytical and numerical modeling in hydrogeology. Use of available software for aquifer test solutions, aquifer simulation modeling, and mass transport. Completion of modeling projects. Includes readings in current literature.

Prerequisite: GEOL 4444.

Co-requisite: SMTE 0094.

GEOL 5438 Mass Transport Modeling in Hydrogeology

4 Semester Credit Hours (4 Lecture Hours)

Principles of numerical modeling of mass transport in groundwater systems. Use of software and computer systems for numerical simulations. Laboratory time devoted to completion of modeling projects. Includes readings in current literature.

Prerequisite: GEOL 4444.

Co-requisite: SMTE 0094.

GEOL 5490 Advanced Topics

4 Semester Credit Hours (1-4 Lecture Hours, 1-4 Lab Hours)

Subject varies. Advanced topics including current literature research. May be repeated for credit when topics are sufficiently different.

GEOL 5596 Directed independent Study

1-5 Semester Credit Hours

Study in areas of current interest.

GEOL 6315 Environmental and Geological Applications of GIS

3 Semester Credit Hours (3 Lecture Hours)

The Geographic Information System (GIS) provides a vehicle for capturing, storing, querying, analyzing, and displaying multidimensional geospatial datasets. This course is designed to introduce students to advanced concepts of GIS and their applications to manage, analyze, and display of multidimensional environmental, geological, and geophysical datasets.

Prerequisite: (PHYS 1401 or 2425) and MATH 2413.

GEOL 6321 Advanced Soil and Groundwater Restoration

3 Semester Credit Hours (3 Lecture Hours)

Advanced study of methods for restoring contaminated soil and groundwater by examining the factors and processes influencing the efficacy of remediation systems. An emphasis will be placed on the scientific principles upon which soil and groundwater remediation is based. Cross listed with ESCI 6321.

GEOL 6416 Advanced Geochemistry

4 Semester Credit Hours (4 Lecture Hours)

Advanced study of the Earth processes using principles of chemical equilibrium, thermodynamics, isotope geochemistry and organic geochemistry. Applications of low-temperature geochemistry to geologic problems.

Prerequisite: CHEM 1411, 1412, MATH 2413 and 3414.

GEOL 6422 Advanced Geophysics

4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)

Advanced techniques to assess physical properties and processes of the Earth. Topics include earthquake seismology, refraction and reflection seismology, gravimetry, magnetism, electrical methods, and radioactivity of Earth materials. Application of geophysical methods to the study of the Earth, in oil and gas exploration, and in economic and environmental geology.

Prerequisite: (GEOL 4421, PHYS 1401 or 2425) or (PHYS 1402 or 2426) and (MATH 2413).

GEOL 6423 Advanced Seismic Methods**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Advanced methods for the acquisition, processing, and interpretation of 2D and 3D seismic data. Lectures and field exercises are covered. Topics include conceptual and historical foundations of modern reflection seismology; an overview of seismic wave phenomena in acoustic, elastic, and porous media; acquisition principles for land and marine seismic surveys; methods used to create 2D and 3D seismic images from field data; concepts of dip moveout, prestack migration, and depth migration; concepts and limitations of 3D seismic interpretation for structure, stratigraphy, and rock property estimation; and the interpretation role of attributes, impedance estimation, and AVO.

Prerequisite: GEOL 4422.

GEOL 6424 Advanced Environmental and Engineering Geophysics**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Advanced geophysical techniques for exploring the shallow subsurface for environmental and engineering purposes. Topics include seismic, resistivity, ground penetrating radar, electromagnetic, gravity, and magnetic methods. This course includes both lectures and labs (field exercises) components.

Prerequisite: (PHYS 1401 or 2425) and (PHYS 1402 or 2426) and (MATH 2413).

GEOL 6436 Principles of Petroleum Geology**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Advanced concepts of petroleum geology and techniques used in the exploration and production of hydrocarbon systems. Lectures will cover principles of stratigraphy, sedimentology, hydrocarbon generation, hydrocarbon-trapping mechanisms, reservoir characterization, seismic interpretation, well-log interpretation, and geologic risk analysis.

Prerequisite: GEOL 4411.

GEOL 6444 Advanced Hydrogeology**4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

Advanced study of hydrogeology concepts necessary to understand and question the hydrologic cycle, and specifically, surface water flow; groundwater flow; groundwater-surface water interaction; groundwater sources, occurrence, movement, contamination, and resources; and environmental topics of interest related to water resources.

Prerequisite: CHEM 1411, 1412, MATH 2413 and 3414.