GEOLOGY (GEOL)

GEOL 115 Field Excursions Earth Science 4 Credit Hours (2,4)
A field- and project-based educational experience in which aspects of geology, including environmental geology, earth resources, tectonic processes and the interrelationships among geology and other natural sciences, will be addressed. Travel destinations will include regions with unique natural history.

GEOL 121 Physical Geology 4 Credit Hours (3,2)
The study of processes and features of the rocks and surficial materials that form the Earth's crust. Emphasis will be placed on the dynamic earth including volcanoes, plate tectonics, geologic time, catastrophic events such as earthquakes, and natural resources and their impact on society. The class requires student projects and emphasizes active problem-solving.

GEOL 122 Historical Geology 4 Credit Hours (3,2)
The study of surficial, tectonic, geologic and biologic processes in the context of an Earth history perspective. Emphasis will be placed on evolution of the earth; stratigraphic principles, tectonic framework of North America; rock forming processes, landforms and depositional environments; climate, weathering, surficial processes, and sea level changes; and significant events in the history of plants and animals as recorded by fossils and paleontology studies.

GEOL 223 Earth Materials 4 Credit Hours (3,3)
A course emphasizing techniques for identification and interpretation of minerals and rocks. Major topics include: physical properties, crystalline structure, and chemical composition of minerals, classification of minerals and rocks; interpretation of origins of igneous, sedimentary and metamorphic rocks; plate tectonic occurrence of minerals and rock assemblages; and societal and economic significance of minerals and rocks.
Prerequisite(s): GEOL121 or NSCI102
Pre or Corequisite(s): GEOL122 and CHEM115

GEOL 290 Ind Study: Geology 1-4 Credit Hours (1-4,0)
Special studies and/or research in geology for individuals or small seminar groups. Course content to be arranged with instructor and with approval of the school chair. This course may be repeated for a maximum of eight credits.
Prerequisite(s): Sophomore standing or higher

GEOL 308 Structural Geology Systems 4 Credit Hours (3,3)
A study of the deformation of the Earth through a project-centered approach that focuses on geologic questions. Course emphasis is on descriptive, kinematic and dynamic analysis of geologic structures, deformation mechanisms and the evolution of each in the context of the regional and global geology. Day and/or weekend field excursions may be required.
Prerequisite(s): GEOL121 and GEOL122

GEOL 315 Geoenvironmental Systems 4 Credit Hours (3,3)
The study of environmental issues in a geological context through local and regional field projects. Projects will examine issues such as flooding, shoreline erosion, slope stability, groundwater resources and contamination, and the environmental impact of mineral and energy resource extraction. Emphasis will be placed on the evaluation of environmental issues through the application of geological and environmental field data such as collecting and analyzing sediments, and bedrock and sediment mapping.
Prerequisite(s): GEOL121 and GEOL122, CHEM115 and EVRN131

GEOL 322 Geochemical Systems 4 Credit Hours (3,3)
The study of high- and low-temperature geochemical processes including topics such as chemical, mineral and rock equilibrium, redox reactions, isotopes, chemical weathering, and nutrient cycles. Low-temperature geochemistry will emphasize processes that occur in soil, water, air, and sediments. High-temperature geochemistry will focus on trace and primary elements, igneous and metamorphic processes and geochemical processes that form ore-bearing mineral deposits. A field trip to visit mining, mineral exploration or environmental sites may be required.
Prerequisite(s): GEOL223 and CHEM115

GEOL 334 Hydrologic Sys: Sur/Grd Water 4 Credit Hours (3,3)
A study of hydrologic systems with an emphasis on hydrologic processes on land surface, sub-surface, and near-surface atmosphere. Water movement through geologic materials, aquifer properties, well-water dynamics, and contaminant transport in groundwater; physical basis of evapotranspiration, precipitation, and surface runoff; and causes and solution approaches of water resource problems will be studied. Laboratory components will provide experience in hydrologic field-techniques, analytical methods of hydrologic data, model-based exercises and data analysis.
Prerequisite(s): GEOL121, EVRN131 and MATH111
Pre or Corequisite(s): GEOL122

GEOL 355 Stratigraphy and Sedimentation 4 Credit Hours (3,3)
The study and interpretation of clastic and carbonate sediments and rocks and the environments in which they form. Emphasis will be on stratigraphic and sedimentological principal through topics such as clastic transport and fluid flow; sedimentary structures; lithostratigraphy, biostratigraphy and introducation to sequence stratigraphy; facies recognition and relationships; depositional models; stratigraphic diagrams and maps; diagenesis and tectonics and sedimentation. Weekend fieldtrips may be required.
Prerequisite(s): GEOL223 and GEOL308

GEOL 380 Introduction to Field Geology 3 Credit Hours (0,9)
Introduction to field methods in geology including measurement of sections, mapping techniques, and field interpretation of outcrops. A variety of geologic provinces and environments will be examined. A supply and travel fee will be charged.
Prerequisite(s): GEOL223 and GEOL308

GEOL 410 Engineering Geology 4 Credit Hours (3,2)
This course examines rock types and stratigraphy, geological structures, surface processes, earth materials and methods of geological investigation in the context of behavior of soils and rocks as related to planning and construction. The course includes coverage of in-situ investigations including shallow geophysical methods and emphasizes environmental applications and concerns.
Prerequisite(s): MATH112 or MATH151, CSCI101 or CSCI111, PHYS221 or PHYS231

GEOL 431 Geophysical Systems 4 Credit Hours (3,3)
The study of geologic, geophysical, and environmental problems using geophysical techniques such as: ground penetrating radar, magnetic, electromagnetic, resistivity, gravity, seismics, etc. Projects will involve geophysical and geologic survey design, data collection, data processing, and data interpretation and will require the integration of geophysical and geological data to solve problems.
Prerequisite(s): GEOL308
Pre or Corequisite(s): MATH112 or MATH151 and PHYS221 or PHYS231

GEOL 440 Technology in Geology 2 Credit Hours (1,3)
Students will use modern technologies to evaluate geologic problems and questions. These technologies will change with time but may include computer, field and/or laboratory applications.
Prerequisite(s): Eight or more credits of GEOL3XX and/or GEOL4XX courses

GEOL 450 Geology Seminar I 1 Credit Hour (0,2)
Study, discussion, and laboratory experience in specialized topics in geology. Students will collect and compile information, write research papers, make presentations, and lead discussions.
Prerequisite(s): Two GEOL courses at the 300 level or above

GEOL 451 Geology Seminar II 1 Credit Hour (0,2)
Study, discussion, and laboratory experience in specialized topics in geology. Students will collect and compile information, write research papers, make presentations, and lead discussions.
Prerequisite(s): Two GEOL courses at the 300 level or above

GEOL 468 Tectonic Systems 5 Credit Hours (3,6)
Study of tectonic process and how these processes affect the earth and its evolution with time. A variety of modern and ancient tectonic settings will be studied through projects and case studies. The deformational, geochemical, mineralogical, petrological, sedimentological and geophysical characteristics of individual tectonic settings will be evaluated and their evolution with time will be analyzed. Weekend and/or weeklong field trips may be required.
Prerequisite(s): GEOL223 and GEOL308

GEOL 480 Advanced Field Geology 3 Credit Hours (0,9)
Three weeks of advanced field methods in geology including field mapping of deformed rocks, construction of cross sections, and interpretation of depositional and deformational histories. A variety of geologic provinces and environments will be examined. A supply and travel fee will be charged.
Prerequisite(s): GEOL380 and one additional GEOL course at the 300 level or above

GEOL 490 Research Topics in Geology 1-4 Credit Hours (1-4,0)
Special studies and/or research in geology for individuals or small seminar groups. Course content to be arranged with instructor and with approval of the school chair. This course may be repeated for a maximum of eight credits.
Prerequisite(s): Junior standing or higher

GEOL 495 Senior Project 2 Credit Hours (0,6)
This is a practicum course in which students, under the guidance of a faculty mentor, conduct a scholarly project mutually agreed upon by the student and his/her faculty mentor.
Prerequisite(s): NRES399 or equivalent and permission of the instructor