**GEL - GEOLOGY**

**GEL 1000 Geology and the Environment Cr. 4**
Geological aspects of man’s use of his environment including geological hazards; water; waste disposal; occurrence, use and depletion of natural resources. Offered Irregularly.

**GEL 1010 (PS) Geology: The Science of the Earth Cr. 4**
Introduction to continental drift and plate tectonic theory, geophysics and structure of earth’s crust and interior; rocks and minerals; igneous and volcanic geology; work of running water, glaciers and ground water; geologic time; oceanography. One day field trip. Lecture and required laboratory. Offered Every Term.

**Course Material Fees:** $15

**GEL 1020 Interpreting the Earth Cr. 4**
Sedimentary rocks, sedimentary structures and fossils as tools for interpreting the history of the earth. Paleocoeology of the geologic past and the structure of the earth are emphasized. Offered Fall, Winter.

**Prerequisites:** GEL 1010 with a minimum grade of C

**GEL 1050 Oceanography Cr. 4**
Introductory course in oceanography; includes origin of the ocean basins; ocean currents, waves and tides; life in the oceans and marine ecology; food, mineral and energy resources of the sea. Offered Irregularly.

**GEL 1370 Meteorology: The Study of Weather Cr. 3**
Weather theory including cloud types, cloud formation; types and formation of winds; rain, snow, other precipitation. Storm theory: formation of and dangers in thunderstorms, hurricanes and tornadoes. Atmospheric phenomena: aurora, rainbows, the mirage, twinkling of stars, twilight crepuscular rays; weather forecasting, instruments, maps. Offered Winter.

**GEL 2130 Mineralogy Cr. 4**
Mineral identification using physical and optical properties. Introduction to petrographic microscope and electron microscope/microprobe. Properties and occurrences of major mineral groups and their environmental significance. Check with instructor for field trip destination; field trip to Canada frequently part of course. Offered Fall.

**GEL 3100 Environmental Systems Analysis Cr. 4**
Application of a common framework to quantitative analysis of fluxes, storage, and transformation of matter and energy within environmental systems. Applications include carbon cycling, nutrient cycling, air and water pollution, and population dynamics. Offered Fall.

**Prerequisites:** GEL 1010 with a minimum grade of D- and MAT 1800-6XXX with a minimum grade of D-

**GEL 3160 Petrology Cr. 4**
Classification of igneous and metamorphic rocks using macroscopic and microscopic material and textural characteristics. Occurrence and alteration of each major rock type related to tectonic settings. Mandatory four-day field trip. Offered Winter.

**Prerequisites:** GEL 1020 with a minimum grade of D- and GEL 2130 with a minimum grade of D-

**GEL 3300 Structural Geology Cr. 4**
Description and interpretation of features which result from the origin or deformation of rock masses. Offered Winter.

**Prerequisites:** GEL 1020 with a minimum grade of D-

**GEL 3400 Principles of Sedimentology and Stratigraphy Cr. 4**
Processes which produce sediments, environments of deposition, changes after deposition. Relationship between tectonics and sedimentation. Origin of sedimentary strata. Facies and correlations. Offered Fall.

**Prerequisites:** GEL 1020 with a minimum grade of D- and GEL 2130 with a minimum grade of D-

**Course Material Fees:** $20

**GEL 3450 Principles of Paleontology Cr. 4**
The history of life on earth as recorded in the fossil record. Using fossils to document the evolutionary history of plants, animals and ecosystems through geological time, as well as the practical applications of fossil material in stratigraphic correlation, basin analysis and resource exploration. Offered Fall.

**Prerequisite:** GEL 1010,

**GEL 3600 Special Topics in Geology Cr. 2-3**
Subjects of general interest to geology majors. Topics may include: soil and groundwater pollution; petroleum geology; engineering geology; geochronology; gems and minerals. Offered Irregularly.

**Prerequisites:** GEL 1010 with a minimum grade of D-

**Repeatable for 16 Credits**

**GEL 3650 Field Geology Cr. 1-10**
Field studies involving problems in individual geologic mapping and related techniques. Offered Irregularly.

**Repeatable for 16 Credits**

**GEL 3800 Team Research Cr. 2**
Students work in teams to design and implement a fieldwork based geologic research project. Students develop hypotheses, tests, and fieldwork plans, and they make thin sections and collect data on the scanning electron microscope, finishing with poster presentations. Offered Fall.

**Prerequisite:** GEL 1010, with a minimum grade of D-

**GEL 3990 Directed Study Cr. 1-6**
Offered Every Term.

**Repeatable for 10 Credits**

**GEL 4200 Geomorphology Cr. 4**
Principles underlying development of landforms by geologic agents. Offered Biannually.

**Prerequisites:** GEL 1020 with a minimum grade of D-

**Course Material Fees:** $15

**GEL 4400 40-Hour HAZWOPER Training Cr. 2**

**GEL 4860 Research Cr. 3-4**
Primarily for honors students. Independent laboratory and field work. Offered Every Term.

**Repeatable for 8 Credits**

**GEL 4998 Honors Thesis Cr. 3**
Preparation of an Honors thesis on a subject of general interest to geology majors. Satisfactory completion assures Honors graduation, providing performance in preceding Honors courses has been at Honors level; to be taken under direction of Geology faculty. Offered Every Term.
GEL 5000 Geological Site Assessment Cr. 4
Geologic methods for Phase I Environmental Site Assessments. Application of geostatistics to site characterization. Offered Biannually. **Prerequisites:** (GEL 1010 with a minimum grade of D-) OR (GEL 1000 with a minimum grade of D-)

GEL 5120 Environmental Geochemistry Cr. 4
Survey of some of the geochemical interactions which take place in Earth environments (water, soils, atmosphere, etc.) brought about by natural and human-induced chemical processes. Offered Biannually. **Prerequisites:** CHM 1000-6XXX with a minimum grade of D- and GEL 1010 with a minimum grade of D-

Course Material Fees: $20

GEL 5150 Soils and Soil Pollution Cr. 4
Physical, chemical and mineralogical properties and classification of soils. Behavior of pollutants in soils and methods for reclamation. Offered Spring/Summer. **Prerequisites:** CHM 1220 with a minimum grade of D- and CHM 1230 with a minimum grade of D-

GEL 5210 Applied Geophysics Cr. 4
Introduction to applied geophysical methods used in subsurface exploration. Students will learn the basics of near-surface seismic, gravity, magnetic, electrical resistivity, and electromagnetic methods and data analysis. Offered Biannually. **Prerequisites:** (GEL 1010 with a minimum grade of D-, GEL 3300 with a minimum grade of D-, and MAT 2010 with a minimum grade of D-) OR (PHY 2130 with a minimum grade of D- and PHY 2140 with a minimum grade of D-) OR (PHY 2170 with a minimum grade of D- and PHY 2180 with a minimum grade of D-)

GEL 5420 Mathematical Methods in Earth Science Cr. 4
An introduction to mathematical methods in Earth Science focusing on an introduction to programming in Matlab, using statistical methods, Monte Carlo, and building towards finite difference numerical methods. Offered Biannually.

GEL 5450 Hydrogeology Cr. 4
Characteristics and behavior of groundwater in earth materials. Principles of groundwater flow and solute transport. Introduction to numerical models and methods. Offered Biannually. **Prerequisites:** GEL 1010 with a minimum grade of D- and MAT 2010-6XXX with a minimum grade of D-

GEL 5490 Glacial Geology of North America Cr. 4
Survey treatment of glacial processes; emphasis on the impact of the Laurentide Ice Sheet on the Great Lakes region. Course is offered at advanced undergraduate and graduate levels. Offered Irregularly.

GEL 5510 Environmental Fate and Transport of Pollutants Cr. 4
Basic principles of chemical behavior in the environment; sources, fate, and transport of contaminants. Offered Winter. **Prerequisites:** (CHM 1220 with a minimum grade of D-) OR (CHM 1240 with a minimum grade of D-) OR (CHM 1230 with a minimum grade of D-) OR (CHM 1250 with a minimum grade of D-) OR (MAT 2010-6XXX with a minimum grade of D-)

GEL 5600 Special Topics in Geology Cr. 4
Subjects of general interest to geology majors. Topics may include: mapping; soil and groundwater pollution; petroleum geology; engineering geology; mathematical methods in Earth Science; or others. Offered Irregularly.

GEL 5993 (WI) Writing Intensive Course in Geology Cr. 0
Disciplinary writing assignments under the direction of faculty member. Must be selected in conjunction with course designated as corequisite. See section listing in Schedule of Classes for corequisites available each term. Satisfies the University General Education Writing Intensive Course in the Major requirement. Required for all majors. Offered Every Term.

GEL 6400 Nuclear Geology Cr. 4
Introduction to various physical and chemical age-dating methods applied to geological and cosmological objects. Offered Biannually. **Prerequisites:** (PHY 2130 with a minimum grade of D- and PHY 2140 with a minimum grade of D-) OR (PHY 2170 with a minimum grade of D- and PHY 2180 with a minimum grade of D-) OR (CHM 1220 with a minimum grade of D- and CHM 1230 with a minimum grade of D-) OR (GEL 1010 with a minimum grade of D-)

GEL 6500 Economic Geology Cr. 4
Geology, tectonic setting and genesis of metallic and nonmetallic mineral and hydrocarbon deposits. Resource economics and environmental issues related to resource extraction. Check with instructor for field trip destination; field trip to Canada frequently part of course. Offered Biannually. **Prerequisites:** GEL 2130 with a minimum grade of D-, GEL 3160 with a minimum grade of D-, GEL 3300 with a minimum grade of D-, and GEL 3400 with a minimum grade of D-

GEL 7990 Directed Study in Geology Cr. 2-8
Offered Every Term. Repeatable for 8 Credits

GEL 7997 Research in Geology Cr. 3-4
Independent work in laboratory or field. Offered Every Term. Repeatable for 8 Credits

GEL 8999 Master's Thesis Research and Direction Cr. 1-8
Offered Every Term.