

GEOLOGY (GEOL)

GEOL 102 Oceanography (3 crs)

Survey of the world oceans with emphasis on geologic processes. Also includes chemical, physical, and biological aspects of the sea. Investigates human interaction with the marine environment.

Attributes: LE-I1 Integration, LE-K1 Natural Sciences

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 106 Earth Science (4 crs)

Prerequisite: Limited to elementary-middle education majors. Credit may be earned in only one of the following: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131.

Introduction to basic earth science concepts. Includes study of earth interior and surface processes, earth materials, earth history, earth resources, atmospheric composition and processes, and aspects of the solar system.

Attributes: LE-I1 Integration, LE-K1 Natural Sciences, LE-K1L Natural Sciences with Lab, Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 110 Physical Geology (4 crs)

Prerequisite: Credit may be earned in only one of the following: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131.

A study of earth structure, materials, processes, and history; includes discussion of plate tectonics, volcanism, weathering, glaciation, sedimentation, and metamorphism. The course emphasizes the methods of scientific investigation.

Attributes: LE-I1 Integration, LE-K1 Natural Sciences, LE-K1L Natural Sciences with Lab, Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 115 Environmental Geology (4 crs)

Prerequisite: Credit may be earned in only one of the following: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131. No credit if taken after previous courses GEOL 101 or GEOL 103.

Study of the physical environment. Emphasis on earth processes which affect humans such as rivers, erosion, groundwater, landslides, and earthquakes. Methods are examined for reducing or eliminating the harmful effects of human interaction with the geologic environment.

Attributes: LE-K1 Natural Sciences, LE-K1L Natural Sciences with Lab, LE-R3 Civic and Environmental Issues, Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 118 Societal Issues in Earth Science (4 crs)

Prerequisite: Credit may be earned in only one of the following: GEOL 106, or GEOL 110, or GEOL 115 or GEOL 118, or GEOL 130 and GEOL 131.

Examination of social and economic impact of geologic issues, including instantaneous, catastrophic events such as earthquakes, tsunami and volcanic eruptions, and more mundane, inexorable events such as global climatic change and resource depletion.

Attributes: LE-I1 Integration, LE-K1 Natural Sciences, LE-K1L Natural Sciences with Lab, Field Trip(s) Required, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 122 The Future of Global Energy (3 crs)

• No credit if taken after IDIS 152 when offered as Global Energy in Spring 2009.

Examination of current and future energy sources and alternatives with respect to supply, demand, recovery, distribution, environmental impact and sustainability and the relationship between energy and social, economic and political systems and public policy.

Attributes: LE-I1 Integration, LE-K1 Natural Sciences

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 201 Geology of Our National Parks and Monuments (2 crs)

• No credit toward majors or minors.

A survey of geologic processes and phenomena as exemplified by features of our national parks and monuments. Designed to develop greater appreciation and understanding of natural phenomena.

Attributes: LE-K1 Natural Sciences, LE-R3 Civic and Environmental Issues

Lecture/Discussion Hours: 2

Lab/Studio Hours: 0

GEOL 204 Understanding Earth's Environment (3 crs)

Prerequisite: No credit if taken after or concurrently with BIOL 180 or GEOG 178.

• Satisfies Wisconsin conservation requirement for teaching certification in science and social science.

This environmental science class will explore the interconnectedness of the geosphere, biosphere, pedosphere, hydrosphere, cryosphere, and atmosphere, and how humans interact with each of these systems.

Attributes: LE-K1 Natural Sciences, LE-R3 Civic and Environmental Issues

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 212 Introduction to Geology and Environmental Science (1 cr)

Consent: Instructor Consent Required

•Concurrent enrollment in GEOL 212 and GEOL 312 strongly recommended for all GEOL majors and minors.

This course is designed to introduce Geology and Environmental Science majors and minors to the department faculty, to aid in the development of transferrable skills students will need throughout their coursework and their careers. Faculty and upper-level undergraduates will speak on topics including research opportunities, internships, careers. Students will also attend the Earth Science Seminar Series to see presentations by visiting scholars and professional scientists.

Grading Basis: A-F Grades Only

Lab/Studio Hours: 0

Seminar Hours: 1

GEOL 291 Special Topics (1-3 crs)

Geologic topics of current, special interest; includes field excursions.

Repeat: Course may be repeated

GEOL 301 Earth Resources and Sustainability (3 crs)

Origin, distribution, use, misuse, and conservation of minerals, water, soil, and fuels. Alternative resources and lifestyles for the future are evaluated.

Attributes: LE-K1 Natural Sciences, LE-R3 Civic and Environmental Issues, Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 303 Rocky Mountain Field Studies (3 crs)

Prerequisite: Previous course in GEOL.

Consent: Instructor Consent Required

Field study of geologic features and processes in the Rocky Mountains. One week lecture and laboratory on UW-Eau Claire campus, 10 days in the field on Rocky Mountains. Camping equipment and extensive field work (hiking) is required.

Attributes: LE-K1 Natural Sciences, Special Course Fee Required

Lecture/Discussion Hours: 1

Lab/Studio Hours: 4

GEOL 304 Global Environmental Change (3 crs)

The composition, structure, and dynamics of the solid earth, oceans, and atmosphere are explored to understand the global geochemical and biochemical cycles that govern the natural response to environmental change on global scales.

Attributes: LE-I1 Integration, LE-R3 Civic and Environmental Issues

Lecture/Discussion Hours: 4

Lab/Studio Hours: 0

GEOL 308 Water Resources (3 crs)

Prerequisite: GEOL 106 or GEOL 110 or GEOL 115; or GEOG 101 or GEOG 104 or GEOG 178 or GEOG 185.

Origin, nature, distribution, movement, exploitation, and conservation of surface and subsurface waters; problems associated with development of water resources in Wisconsin and the U.S.

Attributes: LE-K1 Natural Sciences, LE-R3 Civic and Environmental Issues, Field

Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 312 Mineralogy and Petrology I (5 crs)

Prerequisite: GEOL 106, or GEOL 110, or GEOL 115 or GEOL 118, or GEOL 130 and GEOL 131, or MSE 221; CHEM 101, or CHEM 103, or CHEM 105 and CHEM 106, or CHEM 115

Study of minerals and rocks with an emphasis on common rocks in field settings, hand sample identification, and description of common rocks and minerals. Origin of rocks and minerals and interpretation of processes is stressed.

Attributes: Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 4

GEOL 313 Mineralogy and Petrology II (4 crs)

Prerequisite: GEOL 312

Study of igneous, sedimentary, and metamorphic rocks and minerals with an emphasis on laboratory and petrographic analysis.

Lecture/Discussion Hours: 2

Lab/Studio Hours: 4

GEOL 315 Hydrogeology I (4 crs)

Prerequisite: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131; MATH 112, or MATH 114, or MATH 215.

The hydrologic cycle, runoff and streamflow, saturated groundwater flow, contaminant transport, geology of groundwater occurrence, aquifer characterization, groundwater flow to wells, hydrogeologic field techniques, groundwater flow and contaminant transport computer modeling, groundwater development and management.

Attributes: Undergraduate/Graduate Offering, Field Trip(s) Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 3

GEOL 320 Sedimentology and Stratigraphy (4 crs)

Prerequisite: GEOL 312

Origin and evolution of sedimentary rocks, with emphasis on sedimentary processes, stratigraphic principles, and basin evolution.

Attributes: Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 330 Structural Geology (4 crs)

Prerequisite: GEOL 312; GEOL 320

The description and classification of geological structures and the theoretical and physical analysis of rock deformation. Field and laboratory techniques emphasize mapping and the tectonic analysis of geological structures.

Attributes: Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 336 Introduction to Geochemistry (3 crs)

Prerequisite: GEOL 312; CHEM 104 or CHEM 109 or CHEM 115.

Application of chemistry to geologic problems. Principles of isotope geochemistry, thermodynamics, chemistry of natural waters, and computer modeling of geochemical systems.

Attributes: Undergraduate/Graduate Offering

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 337 Analytical Geochemistry Laboratory (1 cr)

Prerequisite: GEOL 336 or concurrent registration.

Theory and application of geochemical instrumentation including x-ray diffraction, x-ray microanalysis, scanning electron microscopy, atomic absorption spectrometry, mass spectrometry, and neutron activation analysis.

Attributes: Undergraduate/Graduate Offering

Lecture/Discussion Hours: 0

Lab/Studio Hours: 2

GEOL 343 Geological Field Excursion (1-2 crs)

Prerequisite: One GEOL course.

Extended travel to study field geology. Students record notes and data in the field and submit final written and/or oral reports. Special course fee to cover costs. Travel proposal must receive approval of department faculty.

Attributes: Special Course Fee Required Varies by Term/Section

Repeat: Course may be repeated for a maximum of 4 credits

Grading Basis: A-F Grades Only

GEOL 345 Geomorphology and Aerial Photography Interpretation (3 crs)

Prerequisite: GEOL 312 or GEOG 304.

A process-oriented analysis of landforms and applied geomorphology. Interpretation of landforms using topographic maps and aerial photographs will be emphasized. Communicating scientific material to expert audiences also will be stressed.

Attributes: Field Trip(s) Required

Lecture/Discussion Hours: 2

Lab/Studio Hours: 2

GEOL 350 Engineering Geology (3 crs)

Prerequisite: GEOL 106, GEOL 110, GEOL 115, or GEOL 118; MATH 114. No credit if taken after GEOL 445/GEOL 645.

Application of geologic principles to civil and environmental engineering, site analysis, and assessment and mitigation of natural hazards.

Attributes: Field Trip(s) Required

Lecture/Discussion Hours: 2

Lab/Studio Hours: 2

GEOL 365 Economic Mineral Deposits (3 crs)

Prerequisite: GEOL 312

Origin, association, and exploitation of metallic and nonmetallic mineral deposits. Study of ore suites from selected mining districts and methods of evaluating ore deposits.

Attributes: Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 2

Lab/Studio Hours: 2

GEOL 390 Geologic Immersion Experience (1-4 crs)

Consent: Instructor Consent Required

Project-based, field intensive geologic immersion experience focusing on the physical, biologic, geomorphic, and tectonic evolution of a geologic province and on societal interaction with the geologic setting.

Attributes: Field Trip(s) Required, Special Course Fee Required Varies by Term/Section

Repeat: Course may be repeated for a maximum of 8 credits

Grading Basis: A-F Grades Only

GEOL 395 Directed Studies (1-3 crs)

Consent: Department Consent Required

- *Use of this course to fulfill department capstone experience requires department approval. See department office for Capstone Proposal form.*

Individual research or study for the advanced geology major who seeks to develop specialized knowledge and skills. Course proposals are student-initiated.

Repeat: Course may be repeated

GEOL 397 Student Academic Apprenticeship (1 cr)

Consent: Instructor Consent Required

- *To be a Student Academic Apprentice (SAA) for a 100- or 200-level GEOL course, the SAA applicant must have a grade of B or above in a previous 4-credit, 100-level GEOL course. To be an SAA for an upper division GEOL course, the SAA applicant must have previously taken the course and earned a grade of B or above.*

Faculty members will select and supervise qualified students to facilitate teaching and learning in a Geology and Environmental Science course. Students enhance their knowledge of course material and their ability to communicate that knowledge.

Attributes: LE-CEL Community-Engaged Learning, Field Trip(s) Required

Repeat: Course may be repeated for a maximum of 4 credits

Grading Basis: S/U Only Grade Basis

GEOL 399 Independent Study - Juniors (1-3 crs)

Prerequisite: Minimum junior standing.

Consent: Department Consent Required

Individual research or studies of distinctive nature.

Repeat: Course may be repeated

GEOL 416 Hydrogeology II (4 crs)

Prerequisite: GEOL 315

Review of principles of groundwater flow and contaminant transport, reactive groundwater contamination, groundwater remediation, chemical evolution of natural groundwater, flow in the unsaturated zone, advanced groundwater flow and contaminant transport computer modeling, water law.

Attributes: Undergraduate/Graduate Offering, Field Trip(s) Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 418 Earth History (4 crs)

Prerequisite: GEOL 312 and GEOL 320.

Origin and evolution of the earth, with emphasis on the physical, biologic, and tectonic history of the planet. Analysis of the concepts of geologic time and biologic evolution. Concentration on geologic field relations and determination of relative geologic history.

Attributes: Field Trip(s) Required, Special Course Fee Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 420 Glacial Geology (3 crs)

Prerequisite: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131; MATH 112, or MATH 114, or MATH 215.

A process-oriented analysis of glacial landforms and sediments. Topographic maps, aerial photographs, and field mapping projects will be used to interpret glacial landforms, sediments, and to solve glacial geologic problems.

Attributes: Field Trip(s) Required

Lecture/Discussion Hours: 2

Lab/Studio Hours: 2

GEOL 445 Engineering Geology and Geophysics (5 crs)

Prerequisite: GEOL 312; PHYS 211 or PHYS 231; MATH 114 or consent of instructor.

Application of geological and geophysical principles to solve human problems. Discussion of soil and rock mechanics, slope stability, earthquake analysis and seismic planning, and geophysical techniques including seismic, gravity, magnetic, electrical, and electromagnetic surveying.

Attributes: Undergraduate/Graduate Offering, Field Trip(s) Required

Lecture/Discussion Hours: 4

Lab/Studio Hours: 2

GEOL 451 MSHA New Miner Training (1 cr)

Prerequisite: GEOL 312

Consent: Instructor Consent Required

- *No credit if taken after GEOL 491 when offered as Responsible Mining: MSHA 24 Hour New Miner Training. May not be used toward 300-level course requirements for any Geology major program.*

New Miner Safety Training (MSHA Part 46, 24 hours) discusses mine safety, hazard awareness and mine protocol, and is federally required to work at surficial mine sites.

Attributes: Field Trip(s) Required, Special Course Fee Required

Grading Basis: S/U Only Grade Basis

Lecture/Discussion Hours: 1

Lab/Studio Hours: 0

GEOL 452 Responsible Mining Seminar (1 cr)

Prerequisite: GEOL 312

Consent: Instructor Consent Required

- *No credit if taken after GEOL 491 when offered as Responsible Mining Seminar*

Industry speakers will discuss environmental and political aspects of responsible mining. Preparation for internships and jobs will be stressed.

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 2

Lab/Studio Hours: 0

GEOL 461 Applied Geophysics (4 crs)

Prerequisite: GEOL 106, GEOL 110, GEOL 115, or GEOL 118; MATH 114; PHYS 211 or PHYS 231. No credit if taken after GEOL 445/ GEOL 645.
Acquisition, processing, and interpretation of geophysical data including seismic, gravity, magnetic, GPR, resistivity, and electromagnetic methods.

Attributes: Undergraduate/Graduate Offering, Field Trip(s) Required
Lecture/Discussion Hours: 3
Lab/Studio Hours: 2

GEOL 468 Geological Field Methods (1 cr)

Prerequisite: GEOL 312, Grade of C or above in GEOL 320
Introduction to fundamental geological field methods and digitization of field data. Topics include basic mapping skills, identifying fossils, collecting and recording structural and stratigraphic data, and digitizing field data using vector graphics software and Geographic Information System mapping technology.

Attributes: Field Trip(s) Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 1
Lab/Studio Hours: 0

GEOL 470 Field Geology I (3 crs)

Prerequisite: GEOL 312, GEOG 335, Grades of C or above in GEOL 320 and GEOL 468
Consent: Instructor Consent Required
• *Three week field course in west Texas and New Mexico.*

Introduction to geologic mapping techniques, with an emphasis on construction of geologic maps and cross-sections in mildly deformed sedimentary and volcanic rocks.

Attributes: LE-I1 Integration, LE-S3 Creativity, Special Course Fee Required

GEOL 471 Field Geology II (3 crs)

Prerequisite: GEOL 330 and GEOL 470.
Consent: Instructor Consent Required
• *Use of this course to fulfill department capstone experience requires department approval. See department office for Capstone Proposal form. Three-week field course in southwestern Montana.*

Introduction to advanced geologic field techniques, with an emphasis on construction of geologic maps and cross-sections in deformed plutonic, volcanic, metamorphic, and sedimentary rocks.

Attributes: Special Course Fee Required

GEOL 472 Field Hydrology (3 crs)

Consent: Instructor Consent Required
• *Use of this course to fulfill GEOL capstone experience requires department approval.*

This three-week course involves hydrologic field studies in western Wisconsin, such as groundwater and aquifer characterization, wetland delineation, evaluation of aquatic ecosystems, and water quality assessment.

Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0

GEOL 491 Advanced Special Topics (1-4 crs)

Prerequisite: Limited to geology majors and minors.
Topics of special interest and current relevance to the advanced geology student; includes field excursions. Topics vary.

Attributes: Undergraduate/Graduate Offering
Repeat: Course may be repeated

GEOL 498 Geology Internship (1-6 crs)

Prerequisite: GEOL 312. Minimum grade point average of 2.5. Minimum sophomore standing.
Consent: Department Consent Required
Provides supervised on-the-job experience in a geologically-related area of interest.

Attributes: Internship
Repeat: Course may be repeated for a maximum of 6 credits
Grading Basis: No Auditors

GEOL 499 Independent Study - Seniors (1-3 crs)

Prerequisite: Minimum senior standing.
Consent: Department Consent Required
Individual project under the direction of a faculty member.

Repeat: Course may be repeated

GEOL 515 Hydrogeology I (4 crs)

Prerequisite: GEOL 106, or GEOL 110, or GEOL 115, or GEOL 118, or GEOL 130 and GEOL 131; MATH 112, or MATH 114, or MATH 215.

Consent: Instructor Consent Required

• *Dual-listed with GEOL 315. Credit may not be earned in both courses.*

The hydrologic cycle, runoff and streamflow, saturated groundwater flow, contaminant transport, geology of groundwater occurrence, aquifer characterization, groundwater flow to wells, hydrogeologic field techniques, groundwater flow and contaminant transport computer modeling, groundwater development and management.

Attributes: Field Trip(s) Required

Grading Basis: No S/U Grade Option

Lecture/Discussion Hours: 3

Lab/Studio Hours: 3

GEOL 536 Introduction to Geochemistry (3 crs)

Prerequisite: GEOL 312; CHEM 104 or CHEM 109 or CHEM 115

Consent: Instructor Consent Required

• *Dual-listed with GEOL 336. Credit may not be earned in both courses.*

Application of chemistry to geologic problems. Principles of isotope geochemistry, thermodynamics, chemistry of natural waters, and computer modeling of geochemical systems.

Grading Basis: No S/U Grade Option

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

GEOL 537 Analytical Geochemistry Laboratory (1 cr)

Prerequisite: GEOL 336/GEOL 536 or concurrent registration.

Consent: Instructor Consent Required

• *Dual-listed with GEOL 337. Credit may not be earned in both courses.*

Theory and application of geochemical instrumentation including x-ray diffraction, x-ray microanalysis, scanning electron microscopy, atomic absorption spectrometry, mass spectrometry, and neutron activation analysis.

Grading Basis: No S/U Grade Option

Lecture/Discussion Hours: 0

Lab/Studio Hours: 2

GEOL 616 Hydrogeology II (4 crs)

Prerequisite: GEOL 315/GEOL 515

Consent: Instructor Consent Required

• *Dual-listed with GEOL 416. Credit may not be earned in both courses.*

Review of principles of groundwater flow and contaminant transport, reactive groundwater contamination, groundwater remediation, chemical evolution of natural groundwater, flow in the unsaturated zone, advanced groundwater flow and contaminant transport computer modeling, water law.

Attributes: Field Trip(s) Required

Grading Basis: No S/U Grade Option

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 645 Engineering Geology and Geophysics (5 crs)

Prerequisite: GEOL 312; PHYS 211 or PHYS 231; MATH 114 or consent of instructor.

Consent: Instructor Consent Required

• *Dual-listed with GEOL 445. Credit may not be earned in both courses.*

Application of geological and geophysical principles to solve human problems. Discussion of soil and rock mechanics, slope stability, earthquake analysis and seismic planning, and geophysical techniques including seismic, gravity, magnetic, electrical, and electromagnetic surveying.

Attributes: Field Trip(s) Required

Grading Basis: No S/U Grade Option

Lecture/Discussion Hours: 4

Lab/Studio Hours: 2

GEOL 661 Applied Geophysics (4 crs)

Prerequisite: GEOL 106, GEOL 110, GEOL 115, or GEOL 118; MATH 114; PHYS 211 or PHYS 231. No credit if taken after GEOL 445/GEOL 645.

• *Dual-listed with GEOL 461. Credit may not be earned in both courses.*

Acquisition, processing, and interpretation of geophysical data including seismic, gravity, magnetic, GPR, resistivity, and electromagnetic methods.

Attributes: Field Trip(s) Required

Lecture/Discussion Hours: 3

Lab/Studio Hours: 2

GEOL 691 Advanced Special Topics (1-4 crs)

Consent: Instructor Consent Required

• *Dual-listed with GEOL 491.*

Topics of special interest and current relevance to the advanced geology student; includes field excursions. Topics vary.

Repeat: Course may be repeated

Grading Basis: No S/U Grade Option

GEOL 793 Directed Studies (1-4 crs)

Consent: Instructor Consent Required

Permits groups of students to study topical areas in an intensive way under the direction of department faculty members.

Repeat: Course may be repeated

Grading Basis: No S/U Grade Option

GEOL 797 Independent Study (1-3 crs)

Consent: Department Consent Required

Independent study projects under direction of faculty members.

Repeat: Course may be repeated

Grading Basis: No S/U Grade Option
