Geology (GEO)

GEO 1010  Introduction to Geology  3:3:0  Fall, Spring, Summer
Studies planet earth: its materials, structure, dynamics, and surface features. Taken alone it is designed for non-science students who want a broad introduction to earth science and a greater appreciation of their physical surroundings. Taken in conjunction with laboratory exercises in GEO 1015, the class is sufficiently rigorous to articulate as an introductory geology class.

GEO 1015  Introduction to Geology Laboratory  1:0:2  Fall, Spring, Summer
Designed to be taken in conjunction with GEO 1010, includes the identification of rocks, minerals, basic land forms and structures. Studies geologic processes occurring in desert, glacial, mountainous and other environments. Taken with GEO 1010, the class will articulate as an introductory earth science class. Course Lab fee of $11 for transportation, lab applies.

GEO 101H  Introduction to Geology  3:3:0  Fall, Spring
Studies the structural and dynamic systems of the earth that create our environment. Stresses geology and related topics chosen for astronomy and meteorology. Course Lab fee of $10 for transportation, lab applies.

GEO 1020  Prehistoric Life  3:3:0  Spring
* Prerequisite(s): BIO 1010 or GEO 1010 recommended
Studies prehistoric life. Uses the concepts of biology and physical science. Studies major groups of ancient animals and plants as found in the rock record. Includes aspects and fundamental concepts of biology, ecology, and geology.

GEO 102H  Introduction to Geology Laboratory  1:0:2  On Sufficient Demand
Includes identification of basic land forms and structures. Studies the geologic processes occurring in desert, glacial, mountains, and other environments. Includes an extended outdoor activity to the Grand Canyon or Capital Reef National Park. Course Lab fee of $10 for transportation, lab applies.

GEO 1080  Introduction to Oceanography  3:3:0  Fall, Spring
Introduces the origin and development of the oceans, marine geology and its effect on life in the seas. Discusses waves, tides, currents, and their impact on shorelines, the ocean floor, and basins. Examines physical processes as they relate to oceanographic concepts. Includes media as an alternative to the actual oceanic experience. Completers should have a basic knowledge and appreciation of the ocean’s impact to the world’s ecology.

GEO 1085  Introduction to Oceanography Laboratory  1:0:2  Spring
A basic laboratory experience in the physical aspects of Oceanography. Introduces applied skills in Oceanography such as Marine Geology and Oceanographic Chemistry. Studies the physical parameters that allow marine life to flourish. Uses maps to study the structure of the sea floor and its relationship to plate tectonics. Provides hands-on experiences with salinity and marine chemistry.

GEO 1220  Historical Geology  3:3:0  Fall, Spring
Examines the origin and development of the Earth. Studies the succession of animals and plants from trilobites through dinosaurs and eventually to man himself, following the changing earth environment in the process. Designed for non-science students who desire an understanding of the history of the Earth. Taken in conjunction with laboratory exercises in GEO 1225, the class is sufficiently rigorous to articulate as an introductory earth science class.

GEO 1225  Historical Geology Laboratory  1:0:2  Fall, Spring
Designed to be taken in conjunction with GEO 1220. Identifies fossils in correlation with their paleoenvironments and geologic time periods. Illustrates and duplicates methodology of the science of historical geology. Taken with GEO 1220, the class will articulate as an introductory earth science class. Course Lab fee of $10 applies.

GEO 204R  Cross-listed with: BIOL 204R  PP  Natural History Excursion  3:1:6  On Sufficient Demand
For students interested in the natural world. Promotes an in-depth look at a wide variety of topics in science, including geology, botany, astronomy, zoology, ecology, and archeology. Consists of 15 hours of lecture plus an appropriate field trip. Participants should gain an interdisciplinary understanding of science and nature.

GEO 2070  Natural History of the Colorado Plateau  3:1:4  On Sufficient Demand
* Corequisite(s): BIOL 2070
Addresses the geological component of the Natural History Course taught in conjunction with BIOL 2070 at the Capitol Reef Field Station during the summer months. Teaches students about the rocks and strata of the area, the processes that mold the landscape, and the relationships between the physical and biological aspects of the ecosystem, including humans. Provides an intense, hands-on field course where faculty and students participate together in a natural setting. Requires students to live and learn at the field station for most of the course.

GEO 3000  Environmental Geochemistry  3:3:0  Fall
* Prerequisite(s): GEO 1010, (MATH 1050 or MATH 1055), CHEM 1220, University Advanced Standing
Introduces low temperature, environmental geochemistry with a focus on the use of quantitative measures to understand surficial geologic processes. Includes equilibrium thermodynamics and kinetics of chemical reactions, aqueous solutions, sorption and complexation, oxidation-reduction reactions, organic geochemistry, and the chemistry of the continental, marine, and atmospheric environments. Numerous examples will be introduced to demonstrate how the conceptual framework can be applied in solving practical problems.

GEO 3080  Earth Materials  3:3:0  Fall
* Prerequisite(s): GEO 1010, GEO 1015, and University Advanced Standing; CHEM 1210 or other chemistry course recommended
* Corequisite(s): GEO 3085
Investigates the physical characteristics, chemical properties, formation, and distribution of geologically significant igneous and metamorphic rocks and minerals. Develops ability to examine rocks and minerals, and analyze their chemical properties to understand geologic processes. Involves field trips, including the possibility of weekend trips. Course Lab fee of $22 for transportation, lab applies.
Geology

GEO 3085
Earth Materials Laboratory
1:0:3 Fall
* Prerequisite(s): GEO 1010, GEO 1015, and University Advanced Standing; CHEM 1210 or other chemistry course recommended
* Corequisite(s): GEO 3080

Focuses on identification and classification of common rocks and minerals in hand sample and introduces optical mineralogy and petrography. Investigates the occurrence and formation of common rocks and minerals through direct observation of their properties and occurrence. Includes field trips, including the possibility of weekend trips.

GEO 3100
Isotope Geochemistry Laboratory
3:3:0 Spring
* Prerequisite(s): (GEO 1010, CHEM 1220, or Instructor Approval) and University Advanced Standing

Provides an introduction to the principles and applications of isotopic geochemistry, which plays an important role in a wide variety of geological, biological, and environmental investigations, and summarizes the analytical techniques used in the field. Examines the theory of radiometric dating and provides an overview of the most commonly used geochronometers. Focuses on stable isotopes with emphasis on oxygen, hydrogen, carbon, nitrogen, and sulfur and with applications in paleoclimatology, ecology and paleoecology, archeology, and hydrology.

GEO 3105
Isotope Geochemistry Laboratory
1:0:2 Spring
* Prerequisite(s): GEO 1010, (MATH 1050 or MATH 1055), CHEM 1220 and University Advanced Standing

Explores the analysis and interpretation of real isotope data and provides hands-on experience in their use to solve problems and answer questions in geochronology, paleoclimatology, hydrology, and archaeology. Requires data analysis utilizing Microsoft Excel.

GEO 3200
Geologic Hazards
4:3:3 Fall
* Prerequisite(s): GEO 1010, GEO 1015, and University Advanced Standing

Investigates the ways in which geologic hazards (including earthquakes, landslides, and volcanoes) impact civilization. Studies the causes of these hazards, how to assess whether each of these hazards is a concern at a particular site, and how each type of hazard can be planned for. Includes field-based exercises. Course Lab fee of $16 for transportation, lab applies.

GEO 3400
Forensic Geology
4:3:3 On Sufficient Demand
* Prerequisite(s): (CHEM 1210 and CHEM 1215 or higher) and University Advanced Standing
* Corequisite(s): CHEM 1220 and CHEM 1225 recommended

Provides a survey of the uses of geology in solving crime. Emphasizes actual criminal cases, hands-on laboratory activities, and critical observation skills. Covers mineral-forming processes in rock, soil, and sediment, and teaches minerals identification with a hand lens and microscope. Examines some or all of the following: mineral pigments related to art forgery and cosmetics; imitation amber and other gems; environmental pollution; and crimes in archeology. Serves as an introduction to trace analysis.

GEO 3500 (Cross-listed with: GEOG 3500)
Geomorphology
4:3:3 Spring
* Prerequisite(s): MATH 1050 or MATH 1055 or equivalent, University Advanced Standing, and one of the following lecture and lab pairs: (GEO 1010 and GEO 1015) or (GEOG 1000 and GEOG 1005)

Examines the geologic processes operating at the Earth’s surface to understand the origin of our planet’s varied landscapes. Explores how landforms respond to climate change, tectonic forcing, and changes in land use. Addresses common geomorphic processes including weathering, soils, hill slope processes, fluvial processes and landforms, aeolian transport, glacial and periglacial environments, karst, and coastal processes.

GEO 3700
Structure and Tectonics
4:3:3 Spring
* Prerequisite(s): GEO 1220, GEO 3080, (PHYS 2010 or PHYS 2210), and University Advanced Standing

Investigates the fundamentals of global plate tectonics and rock deformation. Includes applications to petroleum geology, environmental geology, and engineering geology. Explores geometric techniques of structural analysis in the laboratory. Involves field trips, possibly including weekend trips. Course Lab fee of $21 for transportation, lab applies.

GEO 4080
Petroleum
4:3:3 Spring
* Prerequisite(s): GEO 3080, CHEM 1220, and University Advanced Standing

Intended for students pursuing graduate school in geology or a career in geology such as mining or petroleum geology. Examines mineral equilibrium in igneous, sedimentary, and metamorphic rocks as it pertains to the genesis of these rocks. Introduces students to techniques of petrographic microscopy. Surveys the use of analytical tools in researching igneous and metamorphic rocks, including the use of isotopes for dating and for tracing the origin of magma and the use of the electron microprobe for determining temperatures of metamorphism. Examines the diagenesis of sandstones.

GEO 4200 (Cross-listed with: BIOL 4200, CHEM 4200, PHYS 4200)
Teaching Methods in Science
3:2:2 Spring
* Prerequisite(s): Acceptance into Secondary Education program, senior-level standing, instructor approval, and University Advanced Standing

Examines objectives, instructional methods, and curriculum for teaching science in the secondary school. Includes developing, adapting, evaluating, and using strategies and materials for teaching biological and physical sciences. Explores special needs of the learners and characteristics specific to the science discipline.

GEO 4500
Sedimentary Geology
4:3:3 Spring
* Prerequisite(s): GEO 3080, GEO 1220, GEO 1225, and University Advanced Standing; CHEM 1210 or other chemistry recommended

Exposes a great variety of topics encompassed within the broad field of sedimentary geology. Teaches knowledge of the origin and classification of the major groups of sedimentary rocks, as well as their spatial and temporal distribution as represented in the rock record. Describes the most fundamental stratigraphic principles. Course Lab fee of $21 for transportation, lab applies.
GEO 4510
Paleontology
4:3:2  
Fall
* Prerequisite(s): GEO 1220, GEO 1225, GEO 3080, (BIOL 1010 or BIOL 1610), and University Advanced Standing; GEO 4500 recommended
Exposes students to a wide variety of topics encompassed within the field of paleontology. Offers substantial knowledge of the major groups of life represented in the fossil record. Discusses the most fundamental concepts in paleontology, such as key principles of evolution and paleoecology. Offers an understanding of what paleontologists do, why the field is so crucial, and why all earth scientists should have at least a basic understanding of paleontology. Requires two weekend field trips (dates will be discussed in class). Course Lab fee of $21 for transportation, lab applies.

GEO 4600
Field Experience
4:0:12  
Summer
* Prerequisite(s): GEO 3080, GEO 3700, GEO 4500, and University Advanced Standing
An intensive field course giving students hands-on experience with several aspects of earth science field work. Involves field work for 8 to 10 hours per day, three to five days per week, for four to six weeks. Course Lab fee of $500 for practical experience applies.

GEO 480R
Earth Science Seminar
.5:.5:0  
Fall, Spring
* Prerequisite(s): (GEO 3080 or ENVT 3790 or Instructor Approval) and University Advanced Standing
Exposes students to current research topics in Earth Science and related fields. Provides an opportunity for students to attend bi-weekly lectures presented by department faculty and invited speakers. Lectures are usually a summary of the speaker's recent research results, or investigative projects in an earth science industry. May be repeated for a maximum of 2 credits toward graduation.

GEO 482R (Cross-listed with: ENVT 482R)
Geologic Environmental Internship
1 to 3:0:5 to 15  
Fall, Spring, Summer
* Prerequisite(s): (GEO 1010 or ENVT 1110), (12 credit hours of any GEO, GEOG, or ENVT courses), declared major in any Earth Science program, and University Advanced Standing
Engages students in supervised geologic or environmental work in a professional setting. Requires approval by the Chair of the Department of Earth Science. Includes maintaining a journal of student experiences and preparing a paper summarizing their experience. A maximum of 3 credit hours may be counted toward graduation. May be graded credit/no credit.

GEO 489R
Student Research
1 to 4:0:3 to 12  
Fall, Spring, Summer
* Prerequisite(s): GEO 1015, Junior or Senior standing, instructor approval, and University Advanced Standing
Provides students the opportunity to conduct research under the mentorship of an Earth Science department faculty member. Includes any combination of literature reviews, original research, and/or participation in ongoing departmental projects. Involves students in the methodology of original geologic research. Requires preparation and presentation of oral and/or written reports, typically presented in a public forum. May be repeated for a maximum of 8 credits toward graduation.

GEO 490R
Special Topics in Geology
1 to 4:1 to 4:0 to 9  
On Sufficient Demand
* Prerequisite(s): GEO 1010, GEO 1015, Junior or Senior standing, instructor approval, and University Advanced Standing
Explores or examines special topics in geology. Topics vary depending on student demand and current topics of significance in geology. May be repeated for a maximum of 8 credits toward graduation.

GEO 495R
Independent Study
1 to 4:0:3 to 12  
Fall, Spring, Summer
* Prerequisite(s): GEO 1010, GEO 1015, and University Advanced Standing
Requires an independent study program to be developed with one or more Earth Science faculty member and approved by a committee of Earth Science faculty. Includes some combination of literature review, field work, numerical analysis, and/or laboratory analysis. Involves the preparation of a written report. An oral presentation may also be required. May be repeated for up to 4 credits.

GEO 525R
Advanced Topics for Geology Teachers
1 to 5:1 to 5:0 to 10  
On Sufficient Demand
* Prerequisite(s): Departmental Approval
For licensed teachers or teachers seeking to recently their earth science or integrated science endorsements from the Utah State Office of Education. Teaches principles of geology and pedagogy of teaching geology for teachers in public or private schools. Emphasis will be placed on correlation with the Utah Core Curriculum, the National Science Education Standards, and the Benchmarks of Project 2061. Topics will vary.