

GEOLOGY (GEOL)

GEOL 100 Survey of Earth Science-GTSC2 3 Credits

Physical makeup of the earth, its history, and geology. One field trip is required. Intended for students with majors other than one of the sciences.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 103 Weather and Climate-GTSC2 3 Credits

Non-mathematical introduction to elements of local and global weather: the atmosphere, cloud formation, precipitation, seasons, optical phenomena and violent storms. Students practice making 24-hour weather forecasts.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 104 Oceanography-GT-SC2 3 Credits

Non-mathematical introduction to the scientific study of the ocean. While the course focuses on the hydrosphere subsystem of the Earth System, the atmosphere, cryosphere, lithosphere and biosphere interrelationship with the hydrosphere are also examined.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 105 Geology of Colorado-GTSC2 3 Credits

Introduction to minerals, rocks, geologic time scale and basic geologic terms, followed by geology of Colorado taught with the aid of movies and slides. A one-day field trip is required.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 106 Introduction to Dinosaurs-GT-SC2 3 Credits

Introduction to the study of dinosaurs, from geological, biological and historical perspectives. Intended for students interested in how different areas of science can be applied to a subject of strong human interest. Includes two full-day field trips to local dinosaur quarries and museums.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 107 Natural Hazards and Environmental Geology-GTSC2 3 Credits

Introduction to geologic aspects of our environment. Includes studies of natural hazards, global climate change, geologic resources and emphasizes human interactions with the environment.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 108 Water, People, and Environment - GTSC2 3 Credits

General introduction to the essential nature of water on Earth. Provides students with a comprehensive foundation in the water cycle, human use of water, water and the environment, the politics of water, and the critical issues surrounding water as a resource. Overview of global water issues as well as a focus on water in the American West, including the sources and uses of water, its importance as a resource, the critical issues of water conservation and scarcity, and the legal, political, economic and physical infrastructure that controls water in the American West.

Essential Learning Categories: Natural Sciences

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 111 Principles of Physical Geology-GTSC1 3 Credits

Materials that make up the earth and surface and interior processes that interact to produce the present features of the earth. Laboratory: minerals, rocks, topographic maps, earth quakes, and landforms. Three lectures and one two-hour laboratory per week.

Corequisites: GEOL 111L.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 111L Principles of Physical Geology Laboratory-GTSC1 1 Credit

Lab component required for GEOL 111.

Corequisites: GEOL 111.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 112 Principles of Historical Geology-GTSC1 3 Credits

Origin of the earth and life, changes recorded in rocks and fossils using the geologic time scale and techniques of dating to place events in sequence. Laboratory: topographic and geologic maps, hand samples of rocks, reconstruction exercises, and fossils to interpret regional and general geologic history. One all-day field trip is required. Four lectures and one two-hour laboratory per week.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L or permission of instructor.

Corequisites: GEOL 112L.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 112L Principles of Historical Geology Laboratory-GTSC1 1 Credit

Lab component required for GEOL 112.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L or permission of instructor.

Corequisites: GEOL 112.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 113 Field-Based Introduction to Physical Geology-GTSC1 3 Credits

Introduction to minerals, rocks, Earth structures, mountain building processes, and other elements of physical geology for science and non-science majors. A majority of class time will be spent in the field (including one Saturday) observing and mapping geological features of Western Colorado. There will be some indoor lectures and laboratory work. This course is recommended for prospective K-12 teachers.

Corequisites: GEOL 113L.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

GEOL 113L Field-Based Introduction to Physical Geology Laboratory-GTSC1 1 Credit

Lab component required for GEOL 113.

Corequisites: GEOL 113.

Essential Learning Categories: Natural Science with lab - Both the lab and lecture must be completed

Colorado Guaranteed Transfer (GT) Pathways General Education Curriculum

Fees: Yes.

GEOL 196 Topics 1-3 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 202 Introduction to Field Studies 3 Credits

Mapping of several small areas using GPS, aerial photographs, and pace and compass methods. Profiles, cross-sections, and maps are prepared. Some unscheduled time is required to do mapping projects.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L; and GEOL 112/GEOL 112L (may be taken concurrently).

Fees: Yes.

GEOL 204 Computer Applications in Geology 3 Credits

Quantitative methods of geologic data analysis with the data manipulated on the computer. Methodical approach with limited theoretical emphasis; statistical concepts; special programs for graphical presentation and analysis. Three lectures per week and computer laboratory time to complete exercises are required.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L, and GEOL 112/GEOL 112L, and STAT 200 (recommended but not required) or permission of instructor.

Fees: Yes.

GEOL 250 Environmental Geology 3 Credits

Geologic aspects of environmental problems involving natural processes and anthropogenic activities. Studies include landslides, earthquakes, flooding, coastal erosion, and land subsidence as well as environmental impacts of mineral resource extraction, soil erosion, fossil fuel consumption, and climate change.

Prerequisites: GEOL 100 or GEOL 104 or GEOL 105 or GEOL 111 or GEOL 113.

Fees: Yes.

GEOL 296 Topics 1-3 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 301 Structural Geology 3 Credits

Stress and strain in rock bodies. Description and occurrence of both brittle and ductile rock structures. Laboratory: stereographic and graphical solution of structural problems, the study of maps and cross sections, and some field problems. Three lectures and one two-hour laboratory per week. Four one-day field trips are taken.

Prerequisites: GEOL 202, GEOL 204, and MATH 130.

Corequisites: GEOL 301L.

GEOL 301L Structural Geology Laboratory 1 Credit

Lab component required for GEOL 301.

Prerequisites: GEOL 202, GEOL 204, and MATH 130.

Corequisites: GEOL 301.

Fees: Yes.

GEOL 325 Introduction to Engineering Geology 3 Credits

Geologic principles applied to construction problems; case histories of major projects. Field trips and term project required.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L or permission of instructor.

Fees: Yes.

GEOL 331 Crystallography and Mineralogy 3 Credits

Morphology and classification of crystals; chemistry and genesis of minerals. Laboratory: identification of crystal systems and class, hand specimen identification of minerals, some X-ray diffraction work. Three lectures and one two-hour laboratory per week.

Prerequisites: GEOL 202, GEOL 204, and CHEM 131 or permission of instructor.

Corequisites: GEOL 331L.

GEOL 331L Crystallography and Mineralogy Laboratory 1 Credit

Lab component required for GEOL 331.

Prerequisites: GEOL 202, GEOL 204, and CHEM 131 or permission of instructor.

Corequisites: GEOL 331.

Fees: Yes.

GEOL 333 Geology of the Canyon Country 1 Credit

Three two-hour evening lectures with films and slides used to preview geology of the Colorado Plateau. A five-day field trip to the selected sites is conducted during spring break.

Prerequisites: GEOL 100, GEOL 105 or GEOL 112.

Fees: Yes.

GEOL 340 Igneous and Metamorphic Petrology 3 Credits

Origin, composition and classification of igneous and metamorphic rocks. Laboratory: identification of igneous and metamorphic rocks in hand specimens. Three lectures and one two-hour laboratory per week.

Prerequisites: GEOL 331.

Corequisites: GEOL 340L.

GEOL 340L Igneous and Metamorphic Petrology Laboratory 1 Credit

Lab component required for GEOL 340.

Prerequisites: GEOL 331.

Corequisites: GEOL 340.

Fees: Yes.

GEOL 351 Applied Geochemistry 3 Credits

Geochemistry and its relationship to weathering and soils, geochemical surveys and prospecting techniques, reactions of contaminants with earth materials, and methods of reducing environmental degradation.

Prerequisites: CHEM 121/CHEM 121L, CHEM 122/CHEM 122L, and GEOL 111/GEOL 111L or GEOL 113/GEOL 113L.

GEOL 355 Basic Hydrology 3 Credits

Introduction to physical hydrologic processes including precipitation, evapotranspiration, infiltration, runoff and subsurface flow. Examination of hydrologic modeling, problem solving, and monitoring techniques as well as water resource management issues at both local and global scales.

Prerequisites: MATH 113, or MATH 151 or permission of instructor.

GEOL 359 Survey of Energy-Related Natural Resources 3 Credits

Origin, location, and economics of non-metallic geologic commodities, including phosphates, evaporites, oil, gas, coal, and sedimentary uranium deposits. Students give oral and written reports on two localities.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L; CHEM 131/CHEM 131L, or permission of instructor.

GEOL 361 Survey of Mineral-Related Natural Resources 3 Credits

The genesis, description, and exploitation of metallic and non-metallic natural resources consumed by modern society, such as base-metals, precious metals and gems, aggregates and construction materials, fertilizers, and chemical-industrial commodities. Environmental, economic, and socio-political issues associated with utilization of these resources will also be addressed. At least one field trip to a local resource area will be arranged. Three lectures per week.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L, and CHEM 131/CHEM 131L, or permission of instructor.

GEOL 370 Renewable Energy 3 Credits

Introduction to renewable energy resources from a technical perspective with an emphasis on sustainability. Includes concepts of energy and power, units of measure, sources and forms of energy, uses of energy, energy efficiency, electricity, solar thermal and photovoltaics, bioenergy, hydropower, tidal power, wave power, wind power, geothermal, hydrogen, efficient building design, and integration of renewables with current energy supplies.

Prerequisites: MATH 113 or higher.

Equivalent Course(s): ENVS 370

Terms Typically Offered: Fall.

GEOL 393 Co-operative Education 3-12 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 394 Natural Resources of the West 1 Credit

Seminars covering topics related to natural resources including water, soil, land, mineral and energy resources in the western United States. Guest speakers are invited from the academic community, industry or government agencies to give formal oral presentations followed by informal discussion with students and faculty.

Equivalent Course(s): ENVS 394

Course may be taken multiple times up to maximum of 4 credit hours.

GEOL 395 Independent Study 1-3 Credits

Course may be taken multiple times up to maximum of 6 credit hours.

GEOL 396 Topics 1-3 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

Fees: Yes.

GEOL 402 Applications of Geomorphology 3 Credits

Knowledge of landform genesis and shaping processes is applied to solve modern problems with emphasis on local soils, slopes, rivers, erosional surfaces, and structural framework. Laboratory and field studies used to explore frost, running water, slope movement, ground water, wind, and glaciers which have affected the local environment. Practical techniques of measurement and interpretation, including statistical and computer techniques, used to produce models of landscape development. A term project must be completed. Two major field trips are required. Four lectures and one two-hour laboratory per week.

Prerequisites: GEOL 202 and GEOL 204 and permission of instructor.

Corequisites: GEOL 402L.

GEOL 402L Applications of Geomorphology Laboratory 1 Credit

Lab component required for GEOL 402.

Prerequisites: GEOL 202 and GEOL 204 and permission of instructor.

Corequisites: GEOL 402.

Fees: Yes.

GEOL 404 Geophysics 3 Credits

Exploration for mineral and petroleum and preliminary investigation of sites for engineering and environmental projects with emphasis on refraction and reflection seismic, gravity, magnetic, electrical, electromagnetic ground-penetrating radar, and radioactive methods.

Prerequisites: GEOL 202; GEOL 204; GEOL 112/GEOL 112L; and either PHYS 111/PHYS 111L or PHYS 131/PHYS 131L; PHYS 112/PHYS 112L and MATH 151 are recommended but not required.

Corequisites: GEOL 404L.

Terms Typically Offered: Spring.

GEOL 404L Geophysics Laboratory 1 Credit

Exploration for mineral and petroleum and preliminary investigation of sites for engineering and environmental projects with emphasis on refraction and reflection seismic, gravity, magnetic, electrical, electromagnetic ground-penetrating radar and radioactive methods.

Prerequisites: GEOL 202; GEOL 204; GEOL 112/GEOL 112L; and either PHYS 111/PHYS 111L or PHYS 131/PHYS 131L; PHYS 112/PHYS 112L and MATH 151 are recommended but not required.

Corequisites: GEOL 404.

Terms Typically Offered: Spring.

Fees: Yes.

GEOL 405 Solid Earth Geophysics 3 Credits

Classical physics applied to the study of the earth with emphasis on the origin of the earth, its gravitational, geomagnetic, and geothermal characteristics, seismicity, the dynamics of the earth's crust, plate tectonics, and continental drift. One field trip required.

Prerequisites: GEOL 404 or permission of instructor.

GEOL 411 Paleontology 3 Credits

Taxonomy, morphology, ecology, and geologic range of most groups of invertebrate fossils. Laboratory: field identifications of guide fossils. A one-day field trip is required. Two lectures and one two-hour laboratory per week.

Prerequisites: Beginning Biology course or permission of instructor.

Corequisites: GEOL 411L.

GEOL 411L Paleontology Laboratory 1 Credit

Lab component required for GEOL 411.

Prerequisites: Beginning Biology course or permission of instructor.

Corequisites: GEOL 411.

Fees: Yes.

GEOL 414 Hydrology and River Dynamics 3 Credits

Exploration and analysis of the hydrologic cycle and river forms and processes in the context of watershed science.

Prerequisites: MATH 113 or MATH 151.

Corequisites: GEOL 414L.

Terms Typically Offered: Fall, Spring.

GEOL 414L Hydrology and River Dynamics Laboratory 1 Credit

Exploration and analysis of the hydrologic cycle and river forms and processes in the context of watershed science. Lab component required for GEOL 414.

Prerequisites: MATH 113 or MATH 151.

Corequisites: GEOL 414.

Terms Typically Offered: Fall, Spring.

GEOL 415 Introduction to Ground Water 3 Credits

Relationships of ground water to other water sources, hydrologic cycle, water balance, hydrologic characteristics of rocks, hydraulics and equations defining flow, ground water quality, and contamination, exploration and measurement techniques (including geophysical procedures), state and federal regulations, and computer modeling. Laboratory: Acquisition, analysis, and interpretation of ground water data. Three lectures and one two hour laboratory per week.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L, and MATH 151, and at least high school level biology, chemistry and physics.
Corequisites: GEOL 415L.

GEOL 415L Introduction to Ground Water Laboratory 1 Credit

Lab component required for GEOL 415. Three lectures and one two-hour laboratory per week.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L, and MATH 151, and at least high school level biology, chemistry and physics.
Corequisites: GEOL 415.
Fees: Yes.

GEOL 443 Field-Based Depositional Systems 3 Credits

Analysis of depositional systems with a strong field component. Lectures followed by weekly field trips will show students local examples of all common depositional systems.

Prerequisites: GEOL 202.
Corequisites: GEOL 443L.

GEOL 443L Field-Based Depositional Systems Laboratory 1 Credit

Lab component required for GEOL 443.

Prerequisites: GEOL 202.
Corequisites: GEOL 443.
Fees: Yes.

GEOL 444 Sedimentology and Stratigraphy 3 Credits

Physical, chemical, and biological characteristics of sedimentary rocks, with emphasis on depositional processes and environments, diagenesis, stratigraphic sequences, and correlation. Laboratory emphasis is on description and classification of sedimentary rocks, analysis of depositional environments, and stratigraphic problems. One weekend field trip is required.

Prerequisites: GEOL 202, GEOL 204, GEOL 331/GEOL 331L, and CHEM 131/CHEM 131L.
Corequisites: GEOL 444L.

GEOL 444L Sedimentology and Stratigraphy Laboratory 1 Credit

Lab component required for GEOL 444.

Prerequisites: GEOL 202, GEOL 204, GEOL 331/GEOL 331L, and CHEM 131/CHEM 131L.
Corequisites: GEOL 444.
Fees: Yes.

GEOL 445 Geospatial Database and Design 2 Credits

Creating, editing, and managing geodatabases and working with topology for implementation with GIS. Term project is required. Two lectures and one two-hour lab per week.

Prerequisites: GIST 432/GIST 432L.

GEOL 455 River Dynamics 3 Credits

Introduction to river forms and processes, including basic open-channel hydraulics, sediment transport, fluvial geomorphology and human interactions with river systems. Lab covers field, lab, and computer techniques to understand and model river forms and processes, including human interactions with river systems.

Prerequisites: GEOL 355 or permission of instructor.
Corequisites: GEOL 455L.

GEOL 455L River Dynamics Laboratory 1 Credit

Lab component required for GEOL 455.

Prerequisites: GEOL 355 or permission of instructor.
Corequisites: GEOL 455.
Fees: Yes.

GEOL 463 Subsurface Methods 3 Credits

Concepts and methods of subsurface data analysis and models applied to sedimentary rocks that commonly form subsurface reservoirs and aquifers. Analysis of multiple geoscience data types (e.g., cores, well logs, seismic, statistical data) to construct 2D and 3D subsurface displays and models to evaluate and interpret geological, geophysical characteristics, and petrophysical properties.

Prerequisites: GEOL 111/GEOL 111L or GEOL 113/GEOL 113L.
Terms Typically Offered: Spring.

GEOL 465 Climate Change Science 3 Credits

Analysis of scientific data and evidence that are the basis of climate change science. Students will review geosystem cycles, processes, timescales, and rates as related to global climate within the atmosphere, biosphere, cryosphere, geosphere, and hydrosphere. Skills associated with leading group discussions and scientific critical thinking will be developed.

Terms Typically Offered: Fall.

GEOL 480 Summer Field Camp 6 Credits

This course involves basic training in field geology. Students will perform a variety of geologic mapping exercises using topographic maps and air photos. Students will gain an appreciation of geologic maps - how they are made, the uncertainties and unknowns in mapping, and how mappers deal with them. Most mapping exercises are in deformed sedimentary strata and Quaternary surficial deposits. Some field exercises will involve collection and interpretation of hydrological data. The course is a six full weeks in duration, beginning immediately after conclusion of Spring Semester. Students should not expect to have weekends or holidays off. Students will also be camping out at least half the time or more during this course.

Prerequisites: GEOL 202, GEOL 301/GEOL 301L. GEOL 402/GEOL 402L, and GEOL 444/GEOL 444L are recommended.
Fees: Yes.

GEOL 490 Seminar 3 Credits

Design, implementation, and completion of independent research project including proposal and report writing, and oral presentations. Critiques of geologic literature, data compilation, and periodic oral presentations are also required.

Prerequisites: Upper division standing.

GEOL 493 Co-operative Education 3-12 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 495 Independent Study 1-3 Credits

Course may be taken multiple times up to maximum of 6 credit hours.

GEOL 496 Topics 1-3 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 496L Topics Lab 1-3 Credits

Course may be taken multiple times up to maximum of 15 credit hours.

GEOL 497 Structured Research 1-3 Credits

Geological research under the direct guidance of a faculty member. Designed for junior and senior level students.

Prerequisites: Permission of instructor.
Course may be taken multiple times up to maximum of 9 credit hours.

GEOL 499 Internship 1-4 Credits

Course may be taken multiple times up to maximum of 15 credit hours.