

Geology

LOWER DIVISION

GEOL 100. From Stars to Rocks: Being a Scientist in the 21st Century (3). Introduction to the impact of astronomy, chemistry, physics, and geology on student life and society, practical aspects of the study of the disciplines and associated careers from different perspectives. [E-LD.]

GEOL 103. The Water Planet (3). An exploration of the processes that control water supply to ecosystems and to human civilizations. Topics include: hydrologic cycle, runoff generation, ocean circulation, floods, drought, groundwater; threats to water supply and quality, and the effects of global climate change on water resources. The class will focus on water issues facing California. [B-LD.]

GEOL 106. Earthquake Country (3). Understanding and preparing for earthquakes. Causes and effects of earth tremors; mechanics of earthquakes; how quakes are located and measured; earthquake risk and hazards; earthquake potential in California; earthquake prediction. Not intended for geology majors. [B-LD.]

GEOL 109. General Geology (4). Physical geology. Origin and constitution of the earth, internal and external processes that determine crustal and surficial features, and methods in investigating and interpreting earth history. [Weekly: 3 hrs lect, 3 hrs lab. Prereq: math placement category I, II, or III. B-LD.]

GEOL 110. Field Geology of the Western US (1-2). Investigation of the geologic processes that created selected locales in the western US. Lectures/discussions with extended field trip. The geology will be examined and described by members of the class. [Prereq: GEOL 109, and undergraduate geology major (geosciences option). Course fee required.]

GEOL 210. Earth Systems History (3). Evolution of Earth as an integrated system emphasizing the geological, climatological and biological forces that have shaped it, focusing on North America. Topics focused on geologic time scale and deep time, plate tectonic cycles, fossils and history of life, and the natural and anthropogenic climate history of the Earth. [Prereq: GEOL 109. Rec. CHEM 109, MATH 109.]

UPPER DIVISION

GEOL 300. Geology of California (3). Analyze major geological provinces, lithologic assemblages, economic resources. [Prereq: GEOL 109. Cannot count for geology majors as upper division geology area of specialization. B-UD.]

GEOL 300L. Geology of California Field Trip (1). Three weekends, or one 5-day field trip, through geologic provinces of northern California: the Coast Ranges, Klamath Mountains, Cascade Range, Modoc Plateau, northern Sierra Nevada,

and Great Valley. [Prereq: GEOL 300 (C). Cannot count for geology majors as upper division geology area of specialization. Field trip fee may be required.]

GEOL 303. Earth Resources & Global Environmental Change (3). Origins, occurrence, and limits of important energy, mineral, and water resources. Societal and environmental impacts of resource use and global climate change. Cannot count for geology majors as upper division geology area of specialization. [Prereq: completed LD GE Area A1: Written Communication. Rec: GEOL 109. B-UD.]

GEOL 305. Fossils, Life & Evolution (3). Origin, evolution, and fate of life on earth; history of evolutionary thought and study of fossils; development of life environments (habitats) and biotic communities; recent theories of evolution and mass extinction from an introductory paleontologic perspective. [B-UD. Cannot count for geology majors as upper division geology area of specialization. May require field trip.]

GEOL 306. General Geomorphology (3). Origin and development of landforms, landform classification, geomorphic processes. Methods of geomorphological analysis, topographic map interpretation, and aerial photo interpretation. [Prereq: GEOL 109. Weekly: 2 hrs lect, 3 hrs lab; may require two weekend field trips. B-UD.]

GEOL 308. Natural Disasters (3). Mitigating geologic hazards through technology, behavioral and cultural adaptation, risk assessment and prediction, and communication of hazard information. Case studies of earthquakes, volcanoes, tsunamis, hurricanes, floods, landslides, and climate change. [Cannot count for geology majors as upper division specialization. Prereq: GEOL 106 or GEOL 109 or GEOG 106, and upper division standing. GEOL 308L recommended concurrently. B-UD.]

GEOL 308L. Natural Disasters Laboratory (1). Three-hour weekly laboratory introducing hazard and risk assessment tools including Geographic Information Systems, warning systems and emergency management, including a campus emergency exercise. Emphasis on countries in the Pacific Basin. May require field trip. Must be taken concurrently with GEOL 308. [Prereq: upper division standing. GEOL 308 (C). B-UD.]

GEOL 312. Earth Materials (4). Description, identification, and classification of minerals and igneous, sedimentary, and metamorphic rocks in hand specimen. Occurrence and use of earth materials. [Prereq: GEOL 109, and CHEM 109 (C) or CHEM 107. Weekly: 3 hrs lect, 3 hrs lab. Field trip fee may be required.]

GEOL 314. Petrology (4). Composition, classification, and origin of igneous and metamorphic rocks, as well as sedimentary rocks, to a lesser extent. Analysis and interpretation through thin section, geochemistry, and modeling. [Prereq: GEOL 312. Weekly: 2 hrs lect, 6 hrs lab; may require multi-day field trip. Field trip fee may be required.]

GEOL 332. Sedimentary Geology (4). Identification and interpretation of sedimentary rocks and structures. Application of stratigraphic and dating methods in the earth sciences. Impact of climate and geologic processes on depositional patterns and facies analysis. [Prereq: GEOL 210. Weekly: 3 hrs lect, 3 hrs lab; may require two weekend field trips.]

GEOL 334. Structural Geology (4). Describe and analyze structural features of rocks. Interpret the strain significance of structures. Fundamentals of plate tectonics. Tectonic analysis of regional geologic structure. [Prereq: GEOL 332, MATH 102, PHYX 106 or PHYX 109. Weekly: 3 hrs lect, 3 hrs lab. May require weekend field trips. Field trip fees may be required.]

GEOL 335. Geologic Field Methods I (2). In-class and weekend field projects, map literacy, compass orienteering and measurements, geologic mapping, field note-taking, field data interpretation, preparing stratigraphic columns and geologic cross-sections, technical report writing. [Prereq: GEOL 109, GEOL 210 (C) or GEOL 306 (C). Field trip fee may be required.]

GEOL 344. Paleontology (4). Modes of preservation, skeletal anatomy, systematics and taxonomy, biostratigraphy, paleoecology, paleobiogeography, and evolutionary history of invertebrate groups of traditional importance to geologists. Rec: BIOL 105 or introductory invertebrate zoology course. [Weekly: 3 hrs lect, 3 hrs lab.]

GEOL 380. Special Topics in Geology (1-3). Variable topics. [Rep; multiple enrollments in term. Prereq: GEOL 109, IA. Coreq: GEOL 380L when offered.]



GEOL 380L. Special Topics in Geology Laboratory (1-4). [Rep; multiple enrollments in term. Prereq: GEOL 109, IA. Coreq: GEOL 380 when offered.]

GEOL 399. Supplemental Work in Geology (1-3). Directed study intended for transfer student whose prior coursework is not equivalent to corresponding courses at HSU. [Department approval required. Rep 5 times.]

GEOL 435. Geologic Field Methods II (2). In-class and weekend field projects include: map proficiency, advanced mapping of geological structures and lithological features on topographic maps and aerial photographs, geologic field notes, synthesis of field data with GIS analysis, measuring stratigraphic sections and developing geologic cross-sections, technical report writing. [Prereq: GEOL 306, GEOL 312, GEOL 335, GEOL 334(C). Multi-day field trips required. Field trip fees may be required.]

GEOL 455. Geology Colloquium (1). Geology colloquium with a series of lectures given by invited geoscience professionals. [Rep.]

GEOL 457. Engineering Geology (3). Apply geologic methods, principles, and information to engineering and related fields. Analyze earth materials, properties, and processes significant to modern engineering projects. [Prereq: GEOL

 sustainability-focused;  sustainability-related; *activ* activity; *(C)* may be taken concurrently; *coreq* corequisite(s); *CR/NC* mandatory credit/no credit; *disc* discussion; † Course requires one or more prerequisites. *DCG* Diversity & Common Ground; *d* domestic; *n* non-domestic *LD* Lower Division; *UD* Upper Division; *A B C D E* General Education (*GE*) Areas;

334 or IA. Weekly: 2 hrs lect, 3 hrs lab/field trip for half semester; may require 4-day field trip.]

GEOL 460. Solid Earth Geophysics (3). Principles of seismology, gravity, geodesy, terrestrial heat flow, geomagnetism, and paleomagnetism. Emphasis on earth as a whole: its internal constitution and evolution. [Prereq: MATH 110, and PHYX 107 or PHYX 210. Strongly rec: GEOL 334. Weekly: 2 hrs lect, 3 hr lab.]

GEOL 465. Geosciences Senior Project (2). Combined literature, field, and/or laboratory study, internship, or service learning experience directed toward a geoscience topic or problem. [Prereq: IA.]

GEOL 474. Volcanology (3). Fundamental principles of volcanic eruptions and their products as well as the hazard eruptions pose to human activity using methods and concepts from igneous petrology, sedimentology, stratigraphy, geologic mapping, and geophysics. Topics include origins and storage of magma, volcanic eruption triggers, styles of volcanic eruptions, volcano monitoring, and geologic properties of magma and volcanic flows. This course includes an extended multi-day field trip, required for all students. Students may also complete research projects throughout the semester. [Weekly: 3 hrs lect.; multi-day field trip. Field trip fees may be required. Prereq: GEOL 235, GEOL 314, GEOL 332. Rec: CHEM 109, MATH 109.]

GEOL 475. Geology Field Camp (4). Four weeks supervised field work in the western US. Principles/methods for geological mapping. May include preparing maps, cross-sections, stratigraphic columns, written and oral geologic reports. Living expenses and a portion of camp expenses borne by student. Typically available only during summer. [Prereq: GEOL 314, GEOL 334, GEOL 435, and GPA of 2.0 or higher for all geology courses. GEOL 306 & GEOL 344 recommended.]

GEOL 482. Instrumental Methods in Geology (1-3). Principles of x-ray and electron beam analysis of geologic specimens; experimental petrology techniques. Includes sample preparation, instrument operation and data analysis. Alternating with methods of air photo interpretation, GIS, and remote sensing in geology. [Prereq: PHYX 109 or PHYX 106, and GEOL 312 or GEOL 306; or IA.]

GEOL 485. Seminar (1). Discuss selected topics; correlated reading and reports. [Rep 3 times. Prereq: senior standing or IA.]

GEOL 486. Geology Research Methods (1). Orientation to geology research, including developing a research topic and proposal, designing and planning research, bibliographic research and communication in oral and written format. [Prereq: GEOL 312 or GEOL 332.]

GEOL 490. Senior Thesis (1). Prepare thesis proposal based on field or lab investigation of subject chosen by student and approved by department. Generally undertaken during senior year, but may commence during junior year. [Prereq: GPA of 2.5

or better for all GEOL courses; GEOL 486 with grade of B+ or better and DA.]

GEOL 492. Senior Thesis Project (2). Prepare thesis based on field or lab investigation of subject chosen by student and approved by department. [Prereq: GEOL 490 (C).]

GEOL 499. Independent Study (1-5). Reading, conference, and/or research. [Rep 4 times. Prereq: DA.]

GRADUATE

GEOL 524. Methods of Geochronology (3). Concepts and principles of geologic time. Absolute and relative dating methods. Apply dating techniques to stratigraphic, structural and petrological problems. Geological process rates. Includes 2-3 weekend day field trips. [Prereq: CHEM 109, GEOL 312, GEOL 335 (C), MATH 102.]

GEOL 531. Advanced Physical Geology (1-3). Topics may include igneous and metamorphic petrology, advanced structural geology, paleoecology, volcanology, experimental petrology, geophysics, regional geology investigations, special topics. Field trip fees may be assessed. [Prereq: GEOL 314 and GEOL 334, or IA. With consent, rep up to 4 times.]

GEOL 531L. Advanced Physical Geology Lab (.5-1). When offered, take concurrently with 531. May involve weekend or week-long field trip(s). [Field trip fees may be required.]

GEOL 550. Fluvial Processes (3). Quantitative and qualitative description of river processes. Mechanics of flow and sediment transport in open channels; adjustments of channel form and pattern; channel incision and eco-hydrological controls; fluvial sediment budgets; techniques for field measurement. [Rec: GEOL 306, MATH 110, (PHYX 107 or PHYX 210); or IA. Weekly: 2 hrs lect, one 3-hr lab; may require one-day weekend field trip(s). Field trip fee may be required.]

GEOL 551. Hillslope Processes (3). Quantitative and qualitative description of the mechanics of erosion and deposition on hillslopes. Develop and apply sediment budgets. Hillslope eco-hydrology, weathering, mass movement, slope stability, sheet and rill erosion, slope development models, and techniques for field measurement of slope processes. [Rec: GEOL 306, MATH 110, (PHYX 107 or PHYX 210). Weekly: 2 hrs lect, one 3-hr lab; may require one-day weekend field trip(s).]

GEOL 553. Quaternary Stratigraphy (4). Concepts, theory, methods of Quaternary geology; soil stratigraphy, climate changes; glacial and periglacial processes and patterns. [Prereq: GEOL 306. Weekly: 3 hrs lect, 3 hrs lab/field trip; may require extended weekend field trip(s). Field trip fees may be required.]

GEOL 554. Advanced Geology Field Methods (2). Week-long field excursion to study and interpret quaternary stratigraphic, volcanic, and tectonic problems using appropriate field techniques. Field trip fees may be assessed. [Rep twice.]

GEOL 555. Neotectonics (3). Critical review of Quaternary crustal deformation. Mechanics, rates and distribution of faulting, folding, uplift, subsidence. Methods of measuring/analyzing Quaternary and active tectonic processes. [Prereq: GEOL 334 and GEOL 306. Weekly: 2 hrs lect, 3 hrs lab or field trip; may require extended weekend field trip(s).]

GEOL 556. Hydrogeology (4). Geologic factors controlling the movement and retention of water through the subsurface. Physics of saturated and unsaturated zone hydrology. Geologic and environmental factors affecting groundwater quality and contaminant transport. Modeling of moisture change in the root zone, and vegetative water uptake. [Weekly 3 hrs lect, 3 hrs lab; Field trip fees may be required.]

GEOL 558. Geomorphology of Soils (3). Physical and chemical weathering mechanisms; climosequences, toposequences, chronosequences; relation of soils to erosional and depositional processes; interpretation of paleosols; use of soils in relative dating of geologic deposits. [Prereq: GEOL 306 and CHEM 110, or IA. May require weekend field trip(s). Field trip fees may be required.]

GEOL 561. Applied Geophysics (3). Apply geophysical methods to mineral exploration, geological engineering, crustal studies. Seismic reflection, refraction, electrical resistivity, magnetic and gravity surveying. [Rec: MATH 110, (PHYX 107 or PHYX 210), upper division standing in a technical or scientific field. Weekly: 2 hrs lect, 3 hrs lab.]

GEOL 690. Thesis (1-6). Conduct research and prepare written thesis as required for grad degree. [Prereq: IA. Rep up to 6 units.]

GEOL 699. Independent Study (1-5). Possible modes: reading, conference, research. [Prereq: grad standing. Department approval required. Rep 5 times.]

CREDENTIAL/LICENSURE

GEOL 700. In-Service Professional Development in Geology (1-3). Directed studies for geology professionals desiring advanced or specialized instruction, especially that leading to credentialing or teacher certification. [Prereq: IA. May require 1-day weekend field trip(s). Rep 5 times.]