

Geology

Overview

Folsom Lake College's geology program studies the origin and evolution of the earth, utilizing the principles of mathematics, chemistry, physics, and biology. The concept of geologic time and the principles of uniformitarianism help geologists to understand the processes that shape the earth and its environments. Geologists study rocks, minerals, and fossils in an effort to draw conclusions about both the earth's observable surface processes that meet the eye, and the earth's interior.

Many of the Folsom Lake College geology courses satisfy lower division general education requirements for associate and bachelor degrees. Geology majors planning to transfer to four-year institutions should see a counselor.



Career Options

- Earth Science Educator (middle school through university)
- Emergency Response Manager
- Environmental Engineer
- Environmental Planner/Consultant
- Geologist (private industry or the government)
- Geoscientist
- Hydrogeologist
- Natural Resource Management
- Paleontologist
- Park Naturalist
- Petrologist
- Stratigrapher

Some career options may require more than two years of college study.

Highlights

- Diverse lower division course offerings

- Dynamic geologic environment near the Sierra Nevada, San Andreas Fault, Mono Lake, Death Valley, and Central California Coastal areas

Program Maps

[Science, Technology, Engineering, and Mathematics Undecided Major \(/flc/main/doc/instruction/program-maps/STEM-Undecided-major.pdf\)](/flc/main/doc/instruction/program-maps/STEM-Undecided-major.pdf)

[Geology, A.S.-T Degree \(/flc/main/doc/instruction/program-maps/Geology-AST.pdf\)](/flc/main/doc/instruction/program-maps/Geology-AST.pdf)

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Department Chair [Jason Pittman \(/about-us/contact-us/faculty-and-staff-directory/jason-pittman\)](/about-us/contact-us/faculty-and-staff-directory/jason-pittman)

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Associate Degrees for Transfer

A.S.-T. in Geology

Geology is an interdisciplinary science that combines geological observations and concepts with those of biology, chemistry, physics, and mathematics. Its goals are to study rocks, minerals, fossils, energy and water resources, and to understand geologic principles and processes that shape Earth and its environments.

The Associate in Science in Geology for Transfer (AS-T) provides students with a major that fulfills the general requirements of the California State University for transfer. Students with this degree will receive priority admission with junior status to the California State University system.

The AS-T may be obtained by the completion of 60 transferable, semester units with a minimum of a 2.0 GPA, including (a) the major or area of emphasis described in the Required Program outlined below (earning a C or better in these courses), and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements.

The GEOL AS-T degree does not require coursework in Physics but it is recommended that Geology students take physics coursework as they pursue their Geology degree.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
GEOL 300	Physical Geology	3
GEOL 301	Physical Geology Laboratory	1
GEOL 310	Historical Geology	3
GEOL 311	Historical Geology Laboratory	1
CHEM 400	General Chemistry I	5
CHEM 401	General Chemistry II	5
MATH 400	Calculus I	5
MATH 401	Calculus II	5
Total Units:		28

The Associate in Science in Geology for Transfer (AS-T) degree may be obtained by completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program, and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- evaluate new and accepted ideas about the natural universe using testable methodology.
- articulate orally and/or in writing the importance of continuous examination and modification of accepted ideas as a fundamental element in the progress of science.
- sort, arrange, and quantify objects using the international system of measurement (metric) as the standard.
- analyze a wide variety of natural phenomena geological using basic definitions and fundamental theories of natural science.
- compare the scales at which geologic processes work.
- apply knowledge of current geologic processes to the understanding of Earth's past geologic history.

Career Information

The Geology AS-T degree is designed to facilitate students' successful transfer to four-year institutions that prepare them for advanced study in a variety of graduate programs as well as a variety of career opportunities in the fields of environmental monitoring, protection and remediation, energy and mineral exploration, paleontology, vulcanology, seismology, climatology, teaching, and research.

Associate Degrees

A.A. in Interdisciplinary Studies: Math and Science

The Interdisciplinary Studies degree is designed for students who wish to obtain a broad knowledge of arts and sciences plus additional coursework in a prescribed "Area of Emphasis". This program is a good choice for students planning on transferring to the California State University or University of California. The student will be able to satisfy general education requirements, plus focus on transferable course work that relates to a specific major and/or individual interest. This degree will have an "Area of Emphasis" in Math and Science. These courses emphasize the natural sciences which examine the physical universe, its life forms and its natural phenomena. Courses in math emphasize the development of mathematical and quantitative reasoning skills beyond the level of intermediate algebra. Students will be able to demonstrate an understanding of the methodologies of science as investigative tools. Students will also examine the influence that the acquisition of scientific knowledge has on the development of the world's civilizations. Possible majors at a four-year institution include, but are not limited to: mathematics, biology, chemistry, and physical science.

It is highly recommended that students consult a counselor to determine the classes within each area that will best prepare them for their intended transfer major.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
A minimum of 18 units from the following:		18
You must select courses from at least three different disciplines and complete courses from both math and science. If a course is cross-listed with another on the list, only one may apply to the degree.		
ANTH 300	Biological Anthropology (3)	
ANTH 301	Biological Anthropology Laboratory (1)	
ANTH 303	Introduction to Forensic Anthropology (3)	
ASTR 300	Introduction to Astronomy (3)	
ASTR 400	Astronomy Laboratory (1)	
BIOL 300	The Foundations of Biology (3)	
BIOL 307	Biology of Organisms (4)	
BIOL 310	General Biology (4)	
BIOL 323	Plants and People (4)	
BIOL 350	Environmental Biology (3)	
BIOL 400	Principles of Biology (5)	
BIOL 410	Principles of Botany (5)	
BIOL 420	Principles of Zoology (5)	
BIOL 430	Anatomy and Physiology (5)	
BIOL 431	Anatomy and Physiology (5)	
BIOL 440	General Microbiology (4)	
BIOL 442	General Microbiology and Public Health (5)	
CHEM 305	Introduction to Chemistry (5)	
CHEM 306	Introduction to Organic and Biological Chemistry (5)	
CHEM 400	General Chemistry I (5)	
CHEM 401	General Chemistry II (5)	
CHEM 410	Quantitative Analysis (5)	
CHEM 420	Organic Chemistry I (5)	
CHEM 421	Organic Chemistry II (5)	
GEOG 300	Physical Geography: Exploring Earth's Environmental Systems (3)	
GEOG 301	Physical Geography Laboratory (1)	
GEOG 306	Weather and Climate (3)	
GEOL 300	Physical Geology (3)	
GEOL 301	Physical Geology Laboratory (1)	
GEOL 305	Earth Science (3)	
GEOL 306	Earth Science Laboratory (1)	
GEOL 310	Historical Geology (3)	
GEOL 311	Historical Geology Laboratory (1)	
GEOL 330	Introduction to Oceanography (3)	
GEOL 345	Geology of California (3)	
MATH 300	Introduction to Mathematical Ideas (3)	
MATH 310	Mathematical Discovery (3)	
MATH 335	Trigonometry with College Algebra (5)	
MATH 341	Calculus for Business and Economics (4)	
MATH 343	Modern Business Mathematics (4)	
MATH 355	Calculus for Biology and Medicine I (4)	
MATH 356	Calculus for Biology and Medicine II (4)	
MATH 370	Pre-Calculus Mathematics (5)	
MATH 400	Calculus I (5)	
MATH 401	Calculus II (5)	
MATH 402	Calculus III (5)	
MATH 410	Introduction to Linear Algebra (3)	
MATH 420	Differential Equations (4)	
NUTRI 300	Nutrition (3)	

COURSE CODE	COURSE TITLE	UNITS
NUTRI 340	Nutrition and Metabolism (3)	
PHYS 310	Conceptual Physics (3)	
PHYS 311	Basic Physics (3)	
PHYS 350	General Physics (4)	
PHYS 360	General Physics (4)	
PHYS 411	Mechanics of Solids and Fluids (4)	
PHYS 421	Electricity and Magnetism (4)	
PHYS 431	Heat, Waves, Light and Modern Physics (4)	
PS 302	Introduction to Physical Science (4)	
PSYC 312	Biological Psychology (4)	
PSYC 330	Introductory Statistics for the Behavioral Sciences (3)	
STAT 300	Introduction to Probability and Statistics (4)	
Total Units:		18

The Interdisciplinary Studies: Math and Science Associate in Arts (A.A.) degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See FLC graduation requirements.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- reason quantitatively and empirically (Math and Science).

Geology (GEOL) Courses

GEOL 299 Experimental Offering in Geology

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

GEOL 300 Physical Geology

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	Concurrent enrollment in GEOL 301 is recommended. Students enrolled in GEOL 300 experience higher rates of success when concurrently enrolled in GEOL 301.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 100
Catalog Date:	January 1, 2021

Physical geology is an introduction to the composition and dynamics of the Earth from the atomic scale of minerals to the global scale of plate tectonics. Topics include the composition of minerals and rock, volcanism, earth structures, earthquakes, erosion and surface processes, geologic time, geologic hazards, and plate tectonics. In this course, attention will focus on the rocks, landscapes, and scenic areas of the American West. Emphasis is placed on how humans affect the environment. Successful completion of physical geology prepares the student to recognize, understand, and appreciate processes which continually change our Earth.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- analyze geologic principles and apply critical thinking and problem solving skills.
- evaluate the relationship among the three kinds of rocks.
- explain and interpret geologic processes operating on and within the Earth.
- recognize and appraise geologic hazards.
- examine the importance, availability, and the sustainable use of geologic resources.
- explain the scientific method and communicate complex course concepts effectively in writing and diagrams.

GEOL 301 Physical Geology Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 300; (or may be taken previously)
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C

C-ID: C-ID GEOL 100L
Catalog Date: January 1, 2021

This course provides laboratory experience with the tools and skills discussed in Physical Geology (GEOL 300). Lab topics include; mineral and rock identification, map and air photograph interpretation, landform identification, and the study and interpretation of geologic maps and cross-sections. A calculator, ruler, protractor, and GEOL 300 textbook may be required.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- complete and evaluate the time-event sequence on a geologic column by evaluation with both relative and absolute time.
- use geologic tools such as topographic maps, aerial/satellite photos, P and S wave models to compute gradient, construct geologic maps, interpret and evaluate geologic structures and landscapes.
- identify, describe and interpret the physical properties of minerals and their chemical groupings.
- identify and contrast the physical properties of the igneous, metamorphic, and sedimentary rocks.
- compare, examine, and interpret topographic features produced by fluvial, groundwater, glacial, and wind processes.

GEOL 302 Physical Geology

Units: 4
Hours: 54 hours LEC; 54 hours LAB
Prerequisite: None.
Transferable: CSU
General Education: AA/AS Area IV (effective Summer 2021)
Catalog Date: January 1, 2021

An introduction to the principles of geology with emphasis on Earth processes. This course focuses on the internal structure and origin of the Earth and the processes that change and shape it. The laboratory component focuses on the identification of rocks and minerals, topographic and geologic map exercises demonstrating the work of water, wind, ice and gravity and effects of tectonic activity.

Field trips may be required.

This course is not open to students who have completed Geology 300 or Geology 301.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- explain and practically apply the principles of the scientific method
- demonstrate a conceptual understanding of fundamental concepts, principles, and interactions of Earth's systems applicable to the geological sciences
- demonstrate an understanding of plate tectonics and the Earth's resources
- apply understanding of the internal and external processes that shape and form the Earth
- demonstrate an understanding of the rock cycle and identify and describe the basic properties of rocks and minerals
- demonstrate an understanding of the Earth through the identification and evaluation of physical mineral samples.
- demonstrate an understanding of the Earth through the identification and evaluation of physical igneous, sedimentary and metamorphic rock samples.
- demonstrate an understanding of how geological environments are formed, changed and eroded through time
- demonstrate an ability to communicate complex course concepts effectively in writing and diagrams and apply critical thinking and problem solving skills to make informed decisions in life
- demonstrate the ability to read and interpret topographic and geologic maps and answer questions pertaining to geologic processes.

GEOL 305 Earth Science

Units: 3
Hours: 54 hours LEC
Prerequisite: None.
Transferable: CSU; UC (UC credit limitation: No credit for GEOL 305 or 306 if taken after GEOL 300, 301, 310 or 311)
General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID: C-ID GEOL 120
Catalog Date: January 1, 2021

This course is an introductory course covering major topics in geology, oceanography, meteorology, astronomy, scientific method, and philosophy of science. This course is designed for non-science majors.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate the history and place of Earth in the solar system and universe using the scientific method and scientific principles.
- compare and contrast the geology, atmospheres, compositions, and conditions of the planets and moons in our solar system and identify those conditions that make Earth ideal for its current life forms.
- examine and evaluate systems and processes that operate in the atmosphere, hydrosphere, and solid Earth.
- examine how physical properties and processes such as buoyancy and convection drive Earth processes in the various earth sciences.
- analyze how processes in the different earth sciences affect our local, regional, national, and global communities.
- evaluate the impact of human activity on the physical environment of our planet.

GEOL 306 Earth Science Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 305; (or may be taken previously)
Transferable:	CSU; UC (UC credit limitation: No credit for GEOL 305 or 306 if taken after GEOL 300, 301, 310 or 311)
General Education:	CSU Area B3; IGETC Area 5C
Catalog Date:	January 1, 2021

This course emphasizes the scientific methods and systematic laboratory procedures of Earth sciences. Topics include weather analysis, rock and mineral identification, study of geologic concepts by means of topographic maps, astronomical observation and ocean dynamics. A field trip or an appropriate alternative activity will be required as an introduction to geological environments and field methods in geology.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- distinguish specimens of rocks and minerals and explain their formation.
- evaluate how various geological processes work to shape the topography of Earth.
- assemble the basic observations necessary to make a weather prediction.
- relate basic astronomical observations to common astronomical phenomena.
- assess how oceanographic processes operate and interact with meteorological and geological processes.

GEOL 310 Historical Geology

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	GEOL 300 or 305 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 110
Catalog Date:	January 1, 2021

This course covers the origin and geologic history of the Earth and the evolution of its plant and animal inhabitants. Plate tectonic theory is used to explain changes in composition and structure of rocks of the Earth's crust from the formation of the Earth to the present. Emphasis is placed on the formation of sedimentary rocks and how the Earth's environment and processes changes are recorded. Evolution and extinction are studied to understand how they reflect environmental changes in the earth's ocean, atmosphere, and surface.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate relative and absolute age dating techniques as appropriate tools to establish Earth's natural history and geologic time.
- assess theories of evolution and extinction and the logic and evidence leading to their development.
- examine past environmental conditions on Earth to predict possible trends for Earth's future environment (climate trends, sea level, and atmospheric composition).
- analyze how an active geologic environment produces characteristic features seen in stratigraphic records of past environments.
- apply plate tectonic theory to formulate past, present, and future changes in configurations of continents, and the geologic features related to those changes.

GEOL 311 Historical Geology Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 310 (may be taken previously).
Advisory:	GEOL 300
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C
C-ID:	C-ID GEOL 110L
Catalog Date:	January 1, 2021

Laboratory studies will accompany and complement GEOL 310, Historical Geology. Use of sedimentary rocks, fossils, geologic maps, and cross sections will aid in interpreting ancient environments, tectonic settings, and geologic history. Other concepts addressed include age relations and correlation of rock and time units, and introduction to fossil identification and biostratigraphy. At least one field trip or an appropriate alternative activity will be required as an introduction to sedimentary environments and field methods in geology.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- explain and practically apply the principles of the scientific method.

- explain and practically apply knowledge of tectonic processes to interpret geologic events throughout geologic time.
- interpret geologic maps, cross sections and stratigraphic columns.
- practically apply the principles of relative dating to interpret sequences of geologic events.
- communicate complex course concepts effectively in writing and diagrams.

GEOL 330 Introduction to Oceanography

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
Catalog Date:	January 1, 2021

The course will provide an introduction to the basic principles and practices of oceanography. Topics will be presented in terms of the applications of physics, geology, chemistry, and biology to a study of the world's oceans. Specific topics will include planetary science and earth origin, the geologic timescale, geography and location systems, matter, marine provinces, sediments, seismology, plate tectonics, seawater composition, geochemical distributions, deep ocean circulation, winds and surface circulation, waves, tides, estuarine environments, biological production, necton, plankton, and benthic organisms. Field trips may be required.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- apply the basic practices and principles of oceanography.
- solve problems using basic chemical and physical principles.
- analyze situations involving the oceans and its resources using scientific principles.
- describe the causes of natural phenomena and increase the appreciation of the physical world.
- relate how our lives and environment have been affected by marine processes.

GEOL 345 Geology of California

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 200
Catalog Date:	January 1, 2021

This course provides a survey of the physical and historical aspects of California geology, emphasizing the linkage of geology and people through economic and social impacts. This course is recommended for non-majors and majors in geology and is of particular value to science, engineering, environmental studies, education, and economics majors. Field trips will be combined with lectures.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate the role of geologic processes within the framework of plate tectonics in the evolution of California's landscape.
- appraise California's geologic resources, their distribution, use, and conservation.
- analyze California's geologic hazards and assess their prediction and mitigation.
- evaluate the continuing interaction of geology and humans in California.
- describe the physiographic provinces of California in terms of rock types, age and tectonic development.
- communicate complex course concepts effectively using written and diagrammatic explanations.

GEOL 390 Field Studies in Geology

Units:	1 - 4
Hours:	9 - 32 hours LEC; 27 - 120 hours LAB
Prerequisite:	GEOL 300 with a grade of "C" or better
Transferable:	CSU; UC
Catalog Date:	January 1, 2021

This course involves the study of geologic principles and processes of specific regions (mountains, deserts, great valley, coastal region, etc.). Course content varies according to field trip destination but may include topics in physical geology, environmental geology, economic geology, and/or introduction to tools and techniques used for Geoscience field research (e.g. map and compass, Global Positioning System (GPS), Geographic Information Systems (GIS), etc.). For specific details, see the course topic description(s) listed in the schedule. Field excursions are required and students will be responsible for providing their own lodging (or camping equipment) and meals. This course may be repeated up to four times under a new topic or destination.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- apply geologic concepts discussed in lecture to observed field conditions.
- compose field notes and collect and analyze field data.
- examine the surrounding physical and/or human environment and formulate explanations for the geologic patterns and processes observed.
- integrate geologic information with other disciplines (geography, biology, ecology, urban studies, anthropology, history, economics, cultural studies, and others), as appropriate, in order to develop a comprehensive view of landscapes and processes.

GEOL 495 Independent Studies in Geology

Units: 1 - 3
 Hours: 54 - 162 hours LAB
 Prerequisite: None.
 Transferable: CSU
 Catalog Date: January 1, 2021

GEOL 499 Experimental Offering in Geology

Units: 0.5 - 4
 Prerequisite: None.
 Transferable: CSU
 Catalog Date: January 1, 2021

Faculty

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