


Geology | American River College


Geology is the study of the origin and evolution of the Earth, using the principles of mathematics, chemistry, physics, and biology. Geologists study rocks, minerals, and fossils in an effort to draw conclusions about the Earth's observable surface processes, as well as those processes taking place inside the Earth. They attempt to determine how the Earth was formed and how it is being changed by natural and man-made activities. Geologists are often involved in remediating environmental problems caused by mining, construction, and manufacturing.

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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 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 Associate in Science in Geology for Transfer (A.S.-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) the Intersegmental General Education Transfer Curriculum (IGETC).

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
CHEM 401	General Chemistry II	5
GEOL 300	Physical Geology	3
GEOL 301	Physical Geology Laboratory	1
GEOL 310	Historical Geology	3
GEOL 311	Historical Geology Laboratory	1
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) the Intersegmental General Education Transfer Curriculum (IGETC).

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 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 transfer degree is designed to facilitate students' successful transfer to four-year colleges 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.S. in General Science

This program provides a broad study in the fields of biological and physical sciences in preparation for transfer to a four-year program and continuation of studies in upper division science courses.

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
A minimum of 18 units from the following:		18 ¹
Physical Science Courses		
ASTR 300	Introduction to Astronomy (3)	
ASTR 310	The Solar System (3)	
ASTR 320	Stars, Galaxies, and Cosmology (3)	
ASTR 330	Introduction to Astrobiology (3)	
ASTR 400	Astronomy Laboratory (1)	
ASTR 481	Honors Astronomy: Stars, Galaxies, and Cosmology (4)	
ASTR 495	Independent Studies in Astronomy (1 - 3)	
ASTR 499	Experimental Offering in Astronomy (0.5 - 4)	
CHEM 305	Introduction to Chemistry (5)	
CHEM 306	Introduction to Organic and Biological Chemistry (5)	
CHEM 309	Integrated General, Organic, and Biological Chemistry (5)	
CHEM 310	Chemical Calculations (4)	
CHEM 400	General Chemistry I (5)	
CHEM 401	General Chemistry II (5)	

COURSE CODE	COURSE TITLE	UNITS
CHEM 420	Organic Chemistry I (5)	
CHEM 421	Organic Chemistry II (5)	
CHEM 423	Organic Chemistry - Short Survey (5)	
CHEM 495	Independent Studies in Chemistry (1 - 3)	
CHEM 499	Experimental Offering in Chemistry (0.5 - 4)	
GEOG 300	Physical Geography: Exploring Earth's Environmental Systems (3)	
GEOG 301	Physical Geography Laboratory (1)	
GEOG 305	Global Climate Change (3)	
GEOG 306	Weather and Climate (3)	
GEOG 307	Environmental Hazards and Natural Disasters (3)	
GEOG 308	Introduction to Oceanography (3)	
GEOG 309	Introduction to Oceanography Lab (1)	
GEOG 391	Field Studies in Geography: Mountain Landscapes (1 - 4)	
GEOG 392	Field Studies in Geography: Coastal Landscapes (1 - 4)	
GEOG 393	Field Studies in Geography: Arid Landscapes (1 - 4)	
GEOG 394	Field Studies in Geography: Volcanic Landscapes (1 - 4)	
GEOG 495	Independent Studies in Geography (1 - 3)	
GEOG 499	Experimental Offering in Geography (0.5 - 4)	
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 320	Global Climate Change (3)	
GEOL 325	Environmental Hazards and Natural Disasters (3)	
GEOL 330	Introduction to Oceanography (3)	
GEOL 331	Introduction to Oceanography Lab (1)	
GEOL 345	Geology of California (3)	
GEOL 390	Field Studies in Geology (1 - 4)	
GEOL 495	Independent Studies in Geology (1 - 3)	
GEOL 499	Experimental Offering in Geology (0.5 - 4)	
PHYS 310	Conceptual Physics (3)	
PHYS 311	Basic Physics (3)	
PHYS 312	Conceptual Physics Laboratory (1)	
PHYS 350	General Physics (4)	
PHYS 360	General Physics (4)	
PHYS 410	Mechanics of Solids and Fluids (5)	
PHYS 421	Electricity and Magnetism (4)	

COURSE CODE	COURSE TITLE	UNITS
PHYS 431	Heat, Waves, Light and Modern Physics (4)	
PHYS 495	Independent Studies in Physics (1 - 3)	
PHYS 499	Experimental Offering in Physics (0.5 - 4)	
PS 300	Introduction to Physical Science (3)	
PS 301	Physical Science Laboratory (1)	
PS 495	Independent Studies in Physical Science (1 - 3)	
PS 499	Experimental Offering in Physical Science (0.5 - 4)	
Biological Science Courses		
ANTH 300	Biological Anthropology (3)	
ANTH 301	Biological Anthropology Laboratory (1)	
ANTH 303	Introduction to Forensic Anthropology (3)	
ANTH 370	Primatology (3)	
ANTH 372	Primatology Field Studies (2)	
ANTH 480	Honors Biological Anthropology (3)	
ANTH 495	Independent Studies in Anthropology (1 - 3)	
ANTH 499	Experimental Offering in Anthropology (0.5 - 4)	
BIOL 300	The Foundations of Biology (3)	
BIOL 301	Evolution (3)	
BIOL 303	Survey of Biology (4)	
BIOL 305	Natural History (4)	
BIOL 310	General Biology (4)	
BIOL 322	Ethnobotany (3)	
BIOL 332	Introduction to Ornithology (4)	
BIOL 342	The New Plagues: New and Ancient Infectious Diseases Threatening World Health (3)	
BIOL 352	Conservation Biology (3)	
BIOL 370	Marine Biology (4)	
BIOL 375	Marine Ecology (3)	
BIOL 390	Natural History Field Study (0.5 - 4)	
BIOL 400	Principles of Biology (5)	
BIOL 410	Principles of Botany (5)	
BIOL 415	Introduction to Biology: Biodiversity, Evolution, and Ecology (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)	
BIOL 482	Honors Marine Biology (4)	
BIOL 495	Independent Studies in Biology (1 - 3)	
BIOL 499	Experimental Offering in Biology (0.5 - 4)	

COURSE CODE	COURSE TITLE	UNITS
BIOT 301	Biotechnology and Human Health (3)	
BIOT 305	Introduction to Bioinformatics (1)	
BIOT 307	Biotechnology and Society (2)	
BIOT 311	Biotechnology Laboratory Methods - Molecular Techniques (2)	
BIOT 312	Biotechnology Laboratory Methods - Microbial and Cell Culture Techniques (2)	
BIOT 499	Experimental Offering in Biology (0.5 - 4)	
NATR 300	Introduction to Natural Resource Conservation and Policy (4)	
NATR 302	Introduction to Wildlife Biology (4)	
NATR 303	Energy and Sustainability (3)	
NATR 304	The Forest Environment (3)	
NATR 305	Fisheries Ecology and Management (4)	
NATR 306	Introduction to Rangeland Ecology and Management (3)	
NATR 307	Principles of Sustainability (4)	
NATR 310	Study Design and Field Methods (4)	
NATR 320	Principles of Ecology (4)	
NATR 322	Environmental Restoration (2)	
NATR 324	Field Studies: Birds and Plants of the High Sierra (1.5)	
NATR 330	Native Trees and Shrubs of California (4)	
NATR 332	Wildflowers of California (3)	
NATR 346	Water Resources and Conservation (3)	
NATR 495	Independent Studies in Natural Resources (1 - 3)	
NATR 499	Experimental Offering in Natural Resources (0.5 - 4)	
PSYC 310	Biological Psychology (3)	
PSYC 311	Biological Psychology Laboratory (1)	
PSYC 495	Independent Studies in Psychology (1 - 3)	
PSYC 499	Experimental Offering in Psychology (0.5 - 4)	
Total Units:		18

¹must be transfer-level and must include one laboratory course in a physical science and one laboratory course in a biological science

The General Science Associate in Science (A.S.) degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation 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 scientific methods.
- analyze a wide variety of natural phenomena using basic definitions and fundamental theories of biological or physical sciences.
- apply appropriate quantitative and qualitative methods to interpret and analyze pertinent data.
- outline the basic concepts and fundamental theories of a natural science.
- 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.

- discuss ethical components of scientific decision making and apply personal and social values within the process of decision making in scientific endeavors.

Geology (GEOL)

GEOL 300 Physical Geology

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 100, 104 or 132; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 100

This course provides an understanding of the dynamic nature of the Earth through the study of Earth processes. Topics include global plate tectonics and related processes such as seismic and volcanic activity. It also covers mineral and rock formation, and those processes related to the development of fluvial, glacial, desert, and coastal environments. The occurrence, use, and abuse of renewable and non-renewable resources such as air, ground and surface water, and fossil fuels are also covered. Field trips may be required.

Student Learning Outcomes

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

- explain the origins and characteristics of igneous, sedimentary, and metamorphic rock types.
- compare divergent, convergent, and transform plate tectonic boundaries in terms of the geologic processes and landforms found at each.
- recognize the dynamic nature of geologic processes and their rates as they relate to Earth's great age.
- analyze problems affecting daily life such as earthquake risks, volcanic hazards, mass wasting problems, rising sea levels, global warming, and use/abuse of natural resources.

GEOL 301 Physical Geology Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 300
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C
C-ID:	C-ID GEOL 100L

This course is a laboratory study of the basic principles of geology and their applications to everyday life. It encompasses the study and identification of common rocks and minerals, the interpretation and recognition of geologic structures and landforms, interpretation of maps, aerial photographs, remote sensing images, seismic information, and analysis of geologic hazards. Field trips may be required.

Student Learning Outcomes

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

- identify and classify minerals by their physical properties.
- evaluate rock samples and differentiate between igneous, sedimentary, and metamorphic rocks.
- appraise major types of aerial photographs, remote sensing imagery, and topographic and geologic maps and interpret geologic information from them.
- interpret ancient geologic, geographic, and environmental settings by using sedimentary rocks.
- formulate views of Earth's interior based on analyzing seismic information.
- explain major Earth features to demonstrate understanding of plate tectonic processes.

GEOL 305 Earth Science

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 32 or 42; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC (UC Credit Limitation: No credit if taken after a college level course in Astronomy, Geology, Oceanography or Meteorology)
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 120

This is an introductory science course covering major topics in geology, oceanography, meteorology, and astronomy. It focuses on Earth as a dynamic and continually evolving planet and emphasizes the relationships between human-Earth interactions. Field trips may be required.

Student Learning Outcomes

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

- describe the Big Bang origin theory of the universe and explain the importance of stellar fusion to the formation of elements that make up the known universe.
- classify the planets in our solar system as terrestrial and Jovian and list the characteristics of each category.
- outline the processes and features associated with running water, groundwater, glaciers, wind, and waves that impact Earth's surface.
- cite the factors/processes that are responsible for producing Earth's seasons, weather, and climate.
- describe divergent, convergent, and transform plate tectonic boundaries in terms of the geologic processes (seismic activity, subduction, volcanism) and landforms found at each.
- illustrate, with real world examples, issues affecting daily life, such as earthquake risks, volcanic hazards, mass wasting, rising sea levels, climate change, and use-abuse of natural resources.
- classify rocks by their visible characteristics as igneous, sedimentary, and metamorphic rock types.

GEOL 306 Earth Science Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 305
Advisory:	MATH 32 and 42; Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC (UC credit limitation: No credit if taken after GEOL 300 or 301)
General Education:	CSU Area B3; IGETC Area 5C
C-ID:	C-ID GEOL 120L

This course emphasizes scientific methods, critical thinking skills, and systematic Earth science laboratory procedures. Topics include weather analysis, rock and mineral identification, study of topographic and geologic maps, and exercises in astronomy and oceanography.

Student Learning Outcomes

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

- apply the scientific method to evaluate Earth science processes.
- distinguish between specimens of rocks and minerals and their modes of formation.
- differentiate between various geological processes that work to shape the topography of Earth.
- analyze atmospheric observations (temperature, pressure, humidity, cloud cover) to make basic weather forecasts.
- examine astronomical patterns and phenomena including planetary motion, solar and lunar eclipses, lunar phases, sun angle, and constellations.
- survey Earth's basic marine processes and describe seafloor topography.
- interpret and analyze various types of maps and satellite imagery used in the Earth sciences.

GEOL 310 Historical Geology

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	GEOL 300, GEOL 305, MATH 100, MATH 104, or MATH 132; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 110

This course covers geologic history of the Earth as shown by the rock record and by the succession of fauna and flora through the processes of evolution and extinction. Plate tectonics and its driving mechanisms are used to understand the assembly and breakup of supercontinents, growth and erosion of mountains and changing sea levels. The evolution of species, ecosystems, climates, and landscapes is placed in a plate tectonics context. Stratigraphic, mineralogic, geochemical, and petrographical techniques for interpreting the sequence of past geological events are studied. Field trips may be required.

Student Learning Outcomes

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

- evaluate the history of the Earth in its 4.6 billion-year history in the context of the geological timescale, and the relative and numerical methods used to construct the timescale.
- describe the mechanisms of evolution and extinction and how they have shaped the history of life and affected geological processes in the past
- describe how the rock cycle has changed over geological time in terms of minerals, igneous, metamorphic and sedimentary rocks
- explain the mechanisms and features of plate tectonics and geological change and how they have shaped the Earth's history
- analyze the assembly, movement, and growth of the continents, and formation and breakup of supercontinents, with special regard for the North American continent
- analyze the factors that have determined the state of Earth's climate system in the past

GEOL 311 Historical Geology Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOL 310
Advisory:	GEOL 300 and 301
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C
C-ID:	C-ID GEOL 110L

This course is a laboratory study in historical geology. It applies principles of physical geology and paleontology in the reconstruction of the history of the earth. Exercises in stratigraphy, paleontology, and interpretation of geologic maps are utilized. Field trips are required.

Student Learning Outcomes

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

- compare the evolution of major fossil phyla
- analyze examples of stratigraphic sequences to determine depositional environments
- analyze rock specimens to infer the processes involved in their origins
- analyze fossil assemblages to infer geologic ages

GEOL 320 Global Climate Change

Same As:	GEOG 305
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 100 or 104 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A

This course explores the history and mechanisms of climate change in Earth's past, as well as the methods that scientists use to investigate climate change. It also focuses on climate change in Earth's recent history (the past few million years) and the role that humans have had in climate change, especially since the industrial revolution. Additionally, it investigates the effects of climate change in today's world and discusses possible technological and political solutions to this vast and increasingly important problem, and how societies may adapt to the changes. Field trips may be required. This course is not open to students who have completed GEOG 305.

Student Learning Outcomes

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

- describe the scientific tools used to study global climate change in the past and present.
- explain the components, processes, and dynamics of the global heat budget, as they pertain to the ocean/atmosphere system.
- describe the various lines of evidence that scientists use to investigate climate change in Earth's deep past.
- explain the conditions that led to extensive climate change over the past 2.5 million years.
- evaluate the human causes of climate change, the evidence surrounding that, and the possible consequences of anthropogenically driven climate change.
- discriminate between and evaluate mechanisms of climate mitigation and adaptation at international, national, state, and local levels.

GEOL 325 Environmental Hazards and Natural Disasters

Same As:	GEOG 307
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 100, 104, or 132; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A

This course covers the environmental effects and applications of Earth-related processes. It focuses on earthquakes, volcanic eruptions, landslides, flooding, hurricanes, as well as covering related current events. Topics also include the availability and exploitation of natural resources, waste disposal, and global climate change. Humans as a force in environmental change are emphasized. This course addresses geology, engineering, environmental studies, natural resources, geography, and science education. One field trip is required. This course is not open to students who have completed GEOG 307.

Student Learning Outcomes

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

- identify and describe potential environmental hazards associated with different geomorphologic settings.
- describe short- and long-term consequences of environmental hazards on human activities.
- compare and contrast renewable and non-renewable natural resources.
- analyze the impact of human activity on natural resources.
- distinguish between short- and long-term global climate trends.
- evaluate current environmental issues that involve Earth system processes.

GEOL 330 Introduction to Oceanography

Same As:	GEOG 308
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	GEOG 300 or GEOL 300
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A

This course is an integrated study of the world's oceans, including the physical, chemical, biological and human-made processes that affect the oceans. Topics include plate tectonics, ocean basins and sediments, water chemistry, waves, tides, shoreline processes, ocean currents and its biosystems. Humans have impacted nearly all aspects of the oceans, which are critical to our species. Regional oceanographic features are emphasized and a field trip to gain familiarity with regional physical shoreline features is required. This course is not open to students who have completed GEOG 308.

Student Learning Outcomes

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

- describe and evaluate the relationships between marine processes and plate tectonics
- assess the impact of human activities on ocean chemistry, biosystems and global climate
- examine common coastal features and processes
- evaluate the impacts of shoreline processes on human activities and structures
- analyze the relationships between weather patterns and oceanic circulation
- assess and interpret the gross chemical composition of the ocean
- evaluate and measure the impacts of resource extraction on marine environmental concerns
- describe the distribution of sediment in the oceans and the processes that move sediment

GEOL 331 Introduction to Oceanography Lab

Same As:	GEOG 309
Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOG 308 or GEOL 330

Advisory:	GEOG 301 or GEOL 301
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C

This course is a laboratory investigation of Earth's oceans, emphasizing coastal processes of California. Most laboratory exercises are incorporated into field studies of California's coast, which involves visiting and comparing several distinct coastal environments. Camping is required, and a small fee is to be paid by the student. This course is not open to students who have completed GEOG 309.

Student Learning Outcomes

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

- assess the physical and chemical similarities and differences of distinct coastal environments
- analyze the changing physical and chemical conditions on biological patterns
- analyze the relationships between sea floor morphology and plate tectonics

GEOL 345 Geology of California

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 32 or MATH 42, AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOL 200

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. It 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 may be required.

Student Learning Outcomes

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

- interpret the formation of California's geologic provinces within the framework of plate tectonics.
- describe California's geologic resources, their distribution, use, and conservation.
- analyze California's geologic hazards and assess their prediction, prevention, and mitigation.
- evaluate the continuing interaction between geology and humans in California.
- locate California's geologic provinces on a map.

GEOL 390 Field Studies in Geology

Units:	1 - 4
Hours:	6 - 24 hours LEC; 36 - 144 hours LAB
Prerequisite:	None.
Transferable:	CSU; UC

This course involves field study of selected locations of geologic interest. 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 geosciences field research (e.g. map and compass, the Global Positioning System (GPS), Geographic Information Systems (GIS), etc.). Field excursions are required and field trip expense fees may be required. A portion of this course may be offered in a TBA component of 18-144 hours which may include composing field notes, making field sketches, collecting various forms of field data, analysis of field data, and use of maps, compass, and/or the Global Positioning System.

Student Learning Outcomes

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

- relate geologic concepts and processes to actual locations and situations.
- compose field notes.
- describe and explain geologic phenomena related to the specific examples under study.
- integrate student-observed geologic information to interpret and explain patterns and processes.
- analyze collected field data.

GEOL 495 Independent Studies in Geology

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

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