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Degree: A.S. for Transfer - Geology  
 A.S. - General Science

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.

### Career Opportunities

- Geologist • Geophysicist • Groundwater Geologist
- Oil and Gas Geologist • Mineralogist • Paleontologist
- Marine Geologist • Environmental Geologist
- Photogeologist • Seismologist • Consulting Geologist
- Soils Engineer • Land Use Planner • Volcanologist
- Planetary Geologist • Geochemist • Economic Geologist
- Mining Geologist • Hydrologist • Government Geologist
- Coal Geologist • Glacial Geologist
- Vertebrate Paleontologist • Geology Professor
- Earth Science Teacher • Forensic Geologist

**This transfer degree can only be awarded using the IGETC pattern.**

### Geology A.S. for Transfer Degree

Major Code, IGETC: 010642A02

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).

### 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 Opportunities

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.

Requirements for Degree		28 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

**Associate in Arts for Transfer Degree Requirements:** The Associate in Science in Geology for Transfer (AA-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) Requirements.

### General Science Degree

Major Code: 011229A01

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.

### 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.

*(continued on next page)*

**(General Science Degree continued)**

- 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.

**Requirements for Degree****18 Units**A minimum of 18 units from the following: ..... 18<sup>1</sup>**Physical Science Courses:**

ASTR	300, 310, 320, 330, 400, 481, 495, 499
CHEM	305, 306, 309, 310, 400, 401, 420, 421, 423, 495, 499
GEOG	300, 301, 305, 306, 307, 308, 309, 391, 392, 393, 394, 495, 499
GEOL	300, 301, 305, 306, 310, 311, 320, 325, 330, 331, 345, 390, 495, 499
PHYS	310, 311, 312, 350, 360, 410, 421, 431, 495, 499
PS	300, 301, 495, 499

**Biological Science Courses:**

ANTH	300, 301, 303, 370, 372, 480, 495, 499
BIOL	300, 301, 303, 305, 310, 322, 332, 342, 352, 370, 375, 390, 400, 410, 415, 420, 430, 431, 440, 442, 482, 495, 499
BIOT	301, 305, 307, 311, 312, 499
NATR	300, 302, 303, 304, 305, 306, 307, 310, 320, 322, 324, 330, 332, 346, 495, 499
PSYC	310, 311, 495, 499

<sup>1</sup>must be transfer-level and must include one laboratory course in a physical science and one laboratory course in a biological science.

**Associate Degree Requirements:** 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.

## Geology

**GEOL 300 Physical Geology****3 Units**

*Advisory: MATH 100, 104 or 132; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*  
*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

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. (C-ID GEOL 100)

**GEOL 301 Physical Geology Laboratory****1 Unit**

*Corequisite: GEOL 300*  
*General Education: CSU Area B3; IGETC Area 5C*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LAB*

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. (C-ID GEOL 100L)

**GEOL 305 Earth Science****3 Units**

*Advisory: MATH 32 or 42; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*  
*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

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. (C-ID GEOL 120)

**GEOL 306 Earth Science Laboratory****1 Unit**

*Corequisite: GEOL 305*  
*Advisory: MATH 32 and 42; Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*  
*General Education: CSU Area B3; IGETC Area 5C*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LAB*

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. (C-ID GEOL 120L)

**GEOL 310 Historical Geology****3 Units**

*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.*  
*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

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. (C-ID GEOL 110)

**GEOL 311 Historical Geology Laboratory****1 Unit**

*Corequisite: GEOL 310*  
*Advisory: GEOL 300 and 301*  
*General Education: CSU Area B3; IGETC Area 5C*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LAB*

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. (C-ID GEOL 110L)

**GEOL 320 Global Climate Change 3 Units**

*Same As: GEOG 305*

*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.*

*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

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.

**GEOL 325 Environmental Hazards and Natural Disasters 3 Units**

*Same As: GEOG 307*

*Advisory: MATH 100, 104, or 132; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*

*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

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.

**GEOL 330 Introduction to Oceanography 3 Units**

*Same As: GEOG 308*

*Advisory: GEOG 300 or GEOL 300*

*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

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.

**GEOL 331 Introduction to Oceanography Lab 1 Unit**

*Same As: GEOG 309*

*Corequisite: GEOG 308 or GEOL 330*

*Advisory: GEOG 301 or GEOL 301*

*General Education: CSU Area B3; IGETC Area 5C*

*Course Transferable to UC/CSU*

*Hours: 54 hours LAB*

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.

**GEOL 345 Geology of California 3 Units**

*Advisory: MATH 32 or MATH 42, AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*

*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

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. (C-ID GEOL 200)

**GEOL 390 Field Studies in Geology 1-4 Units**

*Course Transferable to UC/CSU*

*Hours: 6-24 hours LEC; 36-144 hours LAB*

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.

**GEOL 495 Independent Studies in Geology 1-3 Units**

*Prerequisite: None*

*Course Transferable to CSU*

*Hours: 54-162 hours LAB*

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.