

# GEOL G110: PHYSICAL GEOLOGY

Item	Value
Curriculum Committee Approval Date	10/04/2022
Top Code	191400 - Geology
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	<ul style="list-style-type: none"> <li>Area 5 Natural Sciences (GB1)</li> </ul>
California General Education Transfer Curriculum (Cal-GETC)	<ul style="list-style-type: none"> <li>Cal-GETC 5A Physical Science (5A)</li> <li>Cal-GETC 5C Laboratory Activity (5C)</li> </ul>
Intersegmental General Education Transfer Curriculum (IGETC)	<ul style="list-style-type: none"> <li>IGETC 5A Physical Science (5A)</li> <li>IGETC 5C Laboratory Activity (5C)</li> </ul>
California State University General Education Breadth (CSU GE-Breadth)	<ul style="list-style-type: none"> <li>CSU B1 Physical Science (B1)</li> <li>CSU B3 Laboratory Activity (B3)</li> </ul>

## Course Description

This course is an introductory survey of physical geology and the scientific method, including the internal and surface processes responsible for shaping the Earth and produced from natural resources and geologic landscapes. Past and present geologic processes such as mountain building, climate change, and the evolution of life in the fossil record will be examined. Resource extraction, identification of minerals and rocks with the natural processes are covered in lecture and laboratory work. Recognition of geologic hazards both natural and human caused. Geographical Information Systems (GIS), maps, and digital satellite images are used in the lab. Transfer Credit: CSU; UC. C-ID: GEOL 101. C-ID: GEOL 101.

## Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Apply the scientific method to natural processes operating on Earth both internally and external.
3. Identify the physical properties of minerals, rocks, and sources of energy such as coal, oil and natural gas.
4. Examine the Geological Time Scale with respect to the evolution of the Earth, the fossil record, life forms and mass extinctions.
5. Identify various land forms resulting from geological processes, such as glaciations, volcanic activity, erosion, deposition, and tectonics.

6. Use Geographical Information Systems to determine elevation, slope, gradient, geologic structures and cross sections.

## Course Objectives

- 1. Explain how the Earth's processes and materials affects our lives.
- 2. Explore those surface processes operating on the Earth and their products.
- 3. Identify the internal processes operating on Earth and correlate these processes with phenomena such as earthquakes, volcanism and plate tectonics.
- 4. Outline the manner in which inorganic matter occurs in nature, from the atom through the formation of minerals and then how minerals form rocks.
- 5. Describe the ways in which geology is used in society and identify geologic hazards.
- 6. Describe the origin and occurrence of the Earth's valuable mineral and fossil fuel resources.
- 7. Determine the names of minerals by measuring various physical properties, such as hardness, cleavage, luster and crystal form.
- 8. Interpret topographic maps, draw topographic profiles and 'read' standard U.S.G.S. quadrangle maps.
- 9. Identify the three rock types by an examination of their textures, structures, colors, and mineralogy.
- 10. Identify structures (faults, folds) present, construct geologic cross sections and establish the sequence of geologic events that produced the current geologic and topographic setting.

## Lecture Content

Introduction to Geological Science, the scientific method: the study of minerals rocks and the geologic processes Discover geologic time and the evolution of the Earth's geologic history Geologic Time Scale The fossil record and the evolution of life from marine life to land plants and animals Plate Tectonics the unifying theory Plate Tectonic Model and the driving forces responsible for plate movement Plate boundaries Transform Boundary (San Andreas Fault) Divergent Convergent/subduction/continent to continent Atoms and elements the building blocks for minerals Mineral properties and mineral identification Economic important minerals Specific and special properties of minerals Rock forming minerals Rocks Igneous rocks Plutonic Volcanoes Sedimentary rocks Metamorphic rocks Economic Geology Mineral deposits Oil and gas Fossil fuels Surficial processes River systems Groundwater and artesian flow Glaciations and glaciers Climate change Erosion and deposition by glaciers Erosion by water and wind Deposition of sediments and land forms Earthquakes and geologic faults Landslides Internal Processes Convection and magma flow Plate movement Volcanic flows Internal process forming surficial structures Mountain building and tectonics Tension, compression and shear Tectonic events Landslides Major mountain ranges Ocean basins and the sea coast Waves and currents

- Coast types Erosion and deposition along the coast

## Lab Content

The Scientific Method Hypothesis testing Theory generation Mineral and rock identification Crystal growth Rock forming minerals Economic Minerals Rock identification Plutonic/igneous rocks both at the surface and internal Sedimentary rocks and weathering Metamorphic rocks Topographic Maps Slope and gradient Contour lines and elevation Longitude and latitude Township and range

Grid system Map scales Magnetic and true North Structural block diagrams Cross cutting Unconformities Superposition Faults and folds Normal faults Reverse faults Thrust faults Anticline folds Syncline folds Monocline Basin and domes Hydrology Ground water flow Permeability Porosity Surface water flow Headward erosion Meandering streams Earthquakes Epicenter location Primary and secondary waves Magnitude determination

### **Method(s) of Instruction**

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

### **Reading Assignments**

Textbook. Lab Manual. Websites.

### **Writing Assignments**

Write brief answers to questions in the lab manual, study guide, or complete pre-lab question sets. Answer question sets at the end of section of the textbook. Use deductive reasoning with measured properties to identify minerals and rocks. Use map reading skills to interpret geological and topographic maps.

### **Out-of-class Assignments**

Research paper. Research outline with peer reviewed sources.

### **Demonstration of Critical Thinking**

Measuring physical properties of minerals and using these properties to identify minerals. Examination of rock textures and mineralogies with hand lenses/microscopes and identifying or classifying unknown rocks. Analyzing topographic maps from principles learned in map exercises. Analyzing geologic structures present from the map patterns formed on the surface and principles learned in class. Outlining the geologic history, or sequence of events, by means of using absolute and relative geologic dating principles with given geologic maps and cross sections.

### **Required Writing, Problem Solving, Skills Demonstration**

Write brief answers to questions in the lab manual and study guide. Write answers to questions at the end of chapters covered each week. Use deductive reasoning along with measured properties to identify minerals and rocks. Use map reading skills to interpret geologic and topographic maps.

### **Eligible Disciplines**

Earth science: Master's degree in geology, geophysics, earth sciences, meteorology, oceanography, or paleontology OR bachelor's degree in geology AND master's degree in geography, physics, or geochemistry OR the equivalent. Master's degree required.

### **Textbooks Resources**

1. Required Fletcher, C.. Physical Geology , 4th ed. Wiley and Sons, 2022

### **Manuals Resources**

1. Benneman, B.. Golden 110/106 Lab Manual, Golden West College , 08-29-2022