GEOL G120: HISTORICAL GEOLOGY

Item	Value
Curriculum Committee Approval Date	11/15/2022
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)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1) • CSU B3 Laboratory Activity (B3)

Course Description

This course is an introduction to the development of the Earth through time. The scientific method is used to understand the geologic evolution of land forms such as mountains, oceans, canyons, faults and the tectonic development of the Earth. This course examines how tectonic activity shaped landscapes, climate and the development of life, which started in the ocean and evolved onto land. The geologic time scale is used to understand plant and animal evolution, extinctions, and how modern plant and animal forms developed. Transfer Credit: CSU; UC. C-ID: GEOL 111. **C-ID:** GEOL 111.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Employ the scientific method in lecture material, and in applied laboratory experiments. Illustrate the evolution of the Earth over geologic time with respect to the development of life, ecological development, the fossil record and the impact plate tectonics had on past climates and life forms.
3. Illustrate the formation of continents, mountain ranges, ocean basins and the geomorphology of fluvial, glacial, eolian process on land.
4. Discuss the impacts of the San Andreas Fault on extension tectonics, and the development of the
5. Basin and Range and the current California coastal topography and the formation of various mineral resources along with fossil fuels.
6. Relate paleoclimatology, paleo geographic reconstruction and mass extinctions to tectonic settings, geography and ecological environments throughout the history of the Earth.

Course Objectives

- 1. Use the scientific method to explain the physical, and ecological development of the Earth over geologic time.
- 2. Utilize the fossil record to recognize the major geologic time divisions.
- 3. Explore the various land forms and the physical development of oceans, mountain ranges, canyons, faults and glaciers.
- 4. Explore the geological development of the western North American Continent and the development of California and coast regions.
- 5. Identify the flora and fauna, ecology, biological evolution, mass extinctions, and the environmental and geological conditions of Earth.

Lecture Content

The Scientific Method Observation Problem statement Hypothesis Experiment Evaluation Theory Planet Earth as an evolving system Origin of the Universe Origin of the Earth Geologic History of the Earth Evolution of life forms Geologic Time Scale Minerals and Rocks Igneous environments Sedimentary rocks and color as a key to environment Metamorphic environments Important minerals and the environment of formation Tectonics history of the Earth First continents Ocean basins Climate and tectonics Pangea super continent Snow ball Earth Photosynthetic life and green blue Earth Paleoecology Environmental conditions for the evolution of life Geologic eras and life forms Geologic periods and life forms Transitional fossils Mass extinctions Paleontology Fossil identification Fossil correlation Age dating of fossils Stratigraphy formation and fossils Fossil preservation History of paleontology Land forms and tectonics Unconformities Faults Folds Plate boundaries Plate boundaries favoring aquatic life forms Plate tectonic and mass extinctions Stratigraphy and correlation Index fossil and correlation of fossils across continents Major mountain building events Plate Tectonics and paleoclimate Glaciations and climate change Volcanic hot spots and super volcanoes Yellowstone and mass extinctions of North America Hot spots

Lab Content

Geologic Time Scale Eons, Eras, and Periods: each division of time will be based on life forms and tectonic events Haden eon Archean eon Proterozoic eon Phanerozoic eon Pre-Cambrian life forms Pre-Cambrian/Cambrian boundary Paleozoic Mesozoic Cenozoic Evolution of life and the fossil record Pre-Cambrian and the Cambrian Single cell and multiple cell organisms Blue-green and red algae The Paleozoic life explosion Life in the early oceans Life transition from the ocean to land Terrestrial Plants The Carboniferous Fossil Evolution-Succession Mass extinction events of the Paleozoic Age dating methods Mesozoic life and a tropical Earth Dinosaurs Amphibians and Reptiles Birds Mass extinction volcanic-impact theory Cenozoic Mammals, birds and grasslands Humans Ice ages and the Holocene Species extinctions Fossil Identification linking past organisms with current life forms Index fossils Modes of fossil preservation Extinction in the fossil record Biological evolution Fossil succession Ecology and paleoecology Classification of fossils taxonomy Domain Kingdom Phylum Class Order Family Genus Species The historical significance of sedimentary rocks The sedimentary rock record Fossil occurrences in sedimentary rock types Color importance Paleo-Environmental condition Limestone

formation Shale deposits Sandstone formation Tar and oil Geologic maps and stratigraphy and cross sections Absolute and relative dating Structural features Construction and interpretation of cladograms Age and correlation to other formations and stratigraphic cross sections Interpreting sequences of geologic events Identification of important mineral deposits Banded iron formations Mineral oxidation reduction formation Identification of igneous, sedimentary and metamorphic rock Relate rocks to the tectonic settings Rocks as paleo environmental identifiers Geologic-historical attributes of rocks Field trips during lab time Explore current and past ecology Use geologic and topographic maps Relate current topography to Plate Tectonics Construct a cross section Interpret rock formations

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

Text chapter reading Online selected scientific sites Pre lab assignments

Writing Assignments

Term paper outline and sources Term paper Small group reports

Out-of-class Assignments

Internet assignments Poster and report research Field trip reports

Demonstration of Critical Thinking

Matching geologic strata utilizing the ages of rocks, fossils present, and environment of formation. Compare and contrast land forms across the Earth and draw a correlation between two different regions of the Earth. Utilize the fossils found in layers of rock to reconstruct the past climate and environment they were formed in.

Required Writing, Problem Solving, Skills Demonstration

Term paper utilizing standard Geological Society of America format. Drawing geologic cross sections showing the historical ages of the rocks and how they relate across a geographical region.

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 Harold L. Levin. The Earth Through Time , 11th ed. St. Louis, Missouri: Wiley (latest), 2018

Manuals Resources

1. Chones, Karen and Higginbothan, Kristi. Historical Geology Laboratory Manual, Kendall/Hunt Publishing Company , 01-21-2020

Periodicals Resources

1. Scientific American. First life in the Cambrian, Scientific American Volume 2022