GEOL A160: ENVIRONMENTAL GEOLOGY

Item	Value
Curriculum Committee Approval Date	12/08/2021
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
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• OC Physical/Biological Sci - AA (OB)
Associate Science Local General Education (GE)	• OCC Physical/Biological Sci-AS (OSB)
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

The study of natural environments and the impact of humans on geologic systems and will focus on studies of environmental problems associated with soils, water resources and pollution, energy and mineral utilization, coastal erosion, natural geologic hazards, and global atmospheric changes. Principles of sound management of the geologic environment will be emphasized. PREREQUISITE: ENGL C1000 or concurrent enrollment. Transfer Credit: CSU; UC. C-ID: GEOL 131.**C-ID:** GEOL 131.

Course Level Student Learning Outcome(s)

1. Collect and analyze data based on standard scientific methodology.
2. Determine whether or not a proposed explanation, experimental result, or observation is consistent with a scientific hypothesis for a natural phenomenon and effectively communicate that understanding to others.
3. Explain the constraints the environment places on human activities and recognize the limit of human's ability to control geologic processes.
4. Discuss the necessity and renewability of geologic resources and the obligations their use imposes on humanity.
5. Correctly formulate, solve, and interpret the results of a variety of problems relevant to the natural sciences.

Course Objectives

- 1. Explain the effects of resource utilization on the local environment.
- 2. Analyze the probability of a natural disaster occurring in the local area.
- 3. Explain the hydrological cycle and how it affects the groundwater system in our local area.
- 4. Describe the fate and transport of pollutants in the groundwater system.
- 5. Compare and contrast the magnitudes and intensities of earthquakes.
- 6. Explain the formation of soils and describe the causes and rates of erosion.
- 7. Describe the impact of burning fossil fuels on the composition of the Earths atmosphere.
- 8. Describe the proper handling of hazardous wastes.
- 9. Explain the current status of nuclear waste disposal.
- 10. Identify and describe the various types of geologic hazards in the field.
- 11. Demonstrate an understanding of the occurrences and limitations of natural resources and the problems associated with recovery.
- 12. Apply concepts of environmental geology to evaluate geologic hazards and pollution problems worldwide.
- 13. Demonstrate an understanding of the geologists role in influencing environmental policy.
- 14. Recognize how human activities are causing worldwide climatic changes.
- 15. Recognize atmospheric conditions needed for development of severe weather

Lecture Content

Introduction Geology as a science Scientific method Earths origin Big Bang theory Nebular hypothesis Minerals and rocks Definitions Physical properties Rock-forming minerals Rock types and classification Igneous Sedimentary Metamorphic Rock Cycle Plate tectonic theory Development of theory Continental drift Sea-floor spreading Plate boundaries Divergent Convergent Transform Geologic time Relative dating Absolute dating Geologic time scale Internal Processes Geologic structures Folds Faults Earthquakes Location Strength Hazards Tsunami Volcanoes Types Hazards Prediction External Processes Weathering and soils Mechanical Chemical Soil developmnet Soil types Landslides and amss wasting Slope stability Types of mass wasting MItigation Flooding and groundwater Hydrologic Cycle Dynamics of running water Aquifers and recharge Coastal processess Formation of waves Wave refraction and lognshore currents Wave protection structures Sea level changes Extreme Weather Hurricanes Formation Ranking Damage Tornado Formation Ranking Damage Thun derstorms Formation Ranking Damage Energy and mineral Resources Types and occurences Oil and gas Coal Metallic oreos Non-metallic ores Limitations Current usage Known reserves Population growth Pollution and Waste Disposal Sources Air Oceans Land Human Impact Population trends Human consumption Remediation Techniques Laws and Regulations Fields Act Alquist-Priolo Act City and State Builiding codes Climate Change Causes Past changes Current changes Human-induced Evidence Future Trends

Lab Content

The laboratory portion of this course will include the following lab exercises: 1. Earth materials a. Minerals b. Rocks 2. Topographic maps pt;"> 3. Geologic maps 4. Earthquakes and their location 5. Measuring earthquakes 6. Seismic hazards and land use planning 7. Volcanoes 8. Mass wasting and landslides

Method(s) of Instruction

- Lecture (02)
- Lab (04)

Instructional Techniques

1. Lectures on major environmental problems. 2. Laboratory exercises regarding environmental problems, concentrating on the Southern California area. 3. Field trips to local environmental problems, water agencies, environmental companies. 4. Demonstration 5. Observation 6. Practicum 7. Student presentations 8. Lectures using photographic slides and videos. 9. Discussion sessions in which small groups relate personal observations and research to form group conclusions. 10. Supervised field trips to environmental problem areas, with individualized instruction and supervision. 11. Reading from pertinent scientific journals and discussion/exploration of the issues presented. 12. In-class exercises designed to explore particular topics in greater detail.

Reading Assignments

Students are assigned readings from the textbook as topics are discusse Outside readings pertaining to the geologic environment are periodically assigned.
Current newspaper articles, etc., pertaining to the environment are also assigned. Assigned articles, data and maps on the internet.

Writing Assignments

Lecture exams are composed of essays and short-answers where critical thinking and scientific methodology are required (2 to 4 per semester). Laboratory write-ups are also required. Term projects using word processor, computer graphing skills, and statistical analysis.

Out-of-class Assignments

Lab class with required out-of-class assignments Textbooks readings Handouts Preparing and writing term papers field trips

Demonstration of Critical Thinking

Lecture and Laboratory: 1. Examinations - objective questions, problem solving, essay 2. Term paper

Required Writing, Problem Solving, Skills Demonstration

1. The course will include written examination questions that require critical analysis of geologic/environmental problems. 2. Term paper regarding a local environmental problem. 3. Laboratory problems requiring qualitative and quantitative analyses of environmental problems.

Textbooks Resources

1. Required Montgomery, Carla. Environmental Geology, 10th ed. Dubuque: McGraw-Hill, 2014 2. Required Freeman, T.. Environmental Geology Laboratory, 2nd ed. New York: Wiley, 2011

Manuals Resources

1. Ritter, M.E.. Earth Online: The Physical Environment, Wadsworth Publishing Co. , 01-01-2006