Lecture Contact Hours: 48-54; Homework Hours: 96-108; Total Student Learning Hours: 144-162

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

GEOLOGY 110 – PLANET EARTH

3 hours lecture, 3 units

Catalog Description
Introductory physical science course investigating the composition of the earth and the geologic processes by which it formed. Emphasis is placed on the unifying theory of plate tectonics and the associated activities of volcanism, earthquakes, and mountain building. Topics include crystals, minerals and rocks, their distribution within the planet, and the evolution of the earth across deep time. The sculpturing of the surface of the planet by wind, waves, streams, glaciers and landslides will also be considered.

Prerequisite
None

Course Content
1) Introduction to the scientific method and the principle of uniformitarianism
2) Identification of basic rock forming elements and minerals and the common rocks they form
3) Analysis of the origin and characteristics of the three rock families: igneous, sedimentary and metamorphic
4) Scientific analysis of the Theory of Plate Tectonics
5) Survey of volcanic and tectonic processes and landforms
6) Modeling of Earth's interior including composition and characteristics of material layers, and heat exchange within and between layers
7) Introduction to seismology and volcanology, and the study of earthquake and volcanic activity
8) Analysis of the origin and evolution of ocean basins, continents and mountains
9) Overview of weathering, erosion and mass wasting processes
10) Survey of fluvial, aeolian, glacial and coastal processes and landforms
11) Identification and analysis of geologic hazards such as earthquakes, volcanic eruptions, landslides, tsunamis and floods, and their effects on human activities
12) Modeling of groundwater and its effect on soil, mineral and rock formations
13) Introduction to historical geology including the overview of geologic time, analysis of relative and absolute dating methods, and description of organic and inorganic evolution within this time frame
14) Introduction to geologic and topographic map reading and interpretation
15) Survey of geologic methods for exploring and developing water, mineral and energy resources
16) Assessment of global, regional and local environmental concerns as relevant to topic discussions

Course Objectives
Students will be able to:
1) Identify and utilize the guiding principles of plate tectonics and uniformitarianism to analyze and interpret the geological patterns and processes of planet Earth.
2) Outline the scientific method, describe its applications to the field of geology, and explain its relevance to real world problem solving.
3) Analyze geologic, topographic and geospatial data on maps, tables and graphs, and draw conclusions based on subsequent interpretations.
4) Identify the most common elements in the Earth's crust, describe how they chemically bond to form the major rock-forming minerals, and use physical characteristics such as color, texture and hardness to identify the igneous, sedimentary and metamorphic rocks that they form.

5) Compare and contrast the origin of the three rock families (igneous, sedimentary, metamorphic), describe the physical characteristics of each, and explain the relationships within and between each family.
6) Model the composition and characteristics of Earth's interior and describe how flows of heat and energy affect the Earth's internal structure.
7) Describe the Theory of Plate Tectonics, evaluate the evidence for sea floor spreading, subduction and continental drift, and model the motions and interactions of Earth's lithospheric plates.
8) Model geologic and geomorphic processes in order to explain the development and evolution of common landforms.
9) Compare and contrast competing scientific interpretations of geologic and geomorphic phenomena, and explain how divergent conclusions can be drawn from the analysis of similar evidence.
10) Identify geologic hazards for a given landscape, evaluate their potential for causing damage, and assess the effectiveness of mitigation strategies for preventing natural disasters.
11) Outline the geologic history of planet Earth and describe the significance of organic and inorganic evolution within this time frame.
12) Describe the geologic methods for exploring and developing water, mineral and energy resources, and evaluate their impact on the surrounding environment.

Method of Evaluation
A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.
1) Quizzes and exams that measure the student's ability to recognize, explain, and provide examples of the patterns, processes and relationships associated with Earth's geological systems.
2) Problem solving exercises in which students model real world applications of classroom and textbook materials, e.g., map analysis and interpretation, plate tectonics, geologic landforms and hazards, resource development and environmental impacts, etc.
3) Physical and/or historical geology research project(s) in which students are required to analyze, interpret and draw conclusions from scientific sources.
4) Written student analysis of geologic hazards, resource development, and environmental impacts in the modern world based on historic and modern scientific evidence.

Special Materials Required of Student
None

Minimum Instructional Facilities
1) Smart classroom with writing board, slide and overhead projector/screen
2) Wall maps illustrating global/regional scale physical geography and geology phenomena at Earth's surface (e.g., physiography, geology, ocean basins, plate tectonics, etc.)
3) Physiographic globe and topographic maps
4) Hand samples of common minerals, rocks and fossils

Method of Instruction
1) Integrated classroom lecture, discussion and demonstration
2) Small and large group discussion
3) In-class activities and independent homework/research projects
4) Field trips designed to link course materials to real world phenomena
5) Instructional slides and audio/video presentations
6) Auxiliary use of study groups, peer tutoring and/or instructional office hours

Out-of-Class Assignments
1) Reading assignments

2) Written assignments including research projects

Texts and References

1) Required (representative example): Grotzinger, J.P & T.H. Jordan. *Understanding Earth*, 8th edition, 2020. Print ISBN: 9781319055325, 131905532X eText ISBN: 9781319324643, 1319324649
2) Supplemental: As assigned by instructor

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

1) Working knowledge of the Theory of Plate Tectonics as it relates to sea floor spreading, subduction, continental drift and the evolution of ocean basins, continents and mountains.
2) Understanding and application of the scientific method and the principle of uniformitarianism.
3) Analysis and interpretation of geologic, topographic and geospatial data on maps, tables and graphs.
4) Identification of basic rock forming elements and minerals, and the common rocks they form.
5) Modeling of Earth's interior including composition and characteristics of material layers, and heat exchange within and between layers.
6) Basic understanding of seismology and volcanology, and the evolution of common landforms through earthquake and volcanic activity.
7) Patterns of weathering, erosion and mass wasting, and geologic hazards assessment.
8) Overview of geologic time including analysis of relative and absolute dating methods, and description of organic and inorganic evolution within this time frame.
9) Evaluation of competing scientific theories used to explain geologic and geomorphic phenomena.
10) Survey of geologic methods for exploring and developing water, mineral and energy resources, and the evaluation of their impacts on the surrounding environment.

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1) Apply the fundamental principles of geology to investigate how plate tectonics drives the rock cycle and how geologic phenomena shape the Earth's surface.
2) Utilize principles of geology, physics, and chemistry to explain the evolution of the Earth and its composition.
3) Assess geologic hazards and human impacts on the Earth system.