

GEOL - 6 - Earth Science in Education

COURSE OUTLINE OF RECORD

VIII. General Course Information

Subject:*

GEOL

Course Number:* 6

Descriptive Title:* Earth Science in Education

Course Disciplines:*

Earth Science

Division:

Natural Sciences

Department:*

Earth Science

Catalog Description:*

This course is a broad-based introductory study of earth science for future educators and will include teaching techniques to engage students in science. The topics covered are part of the California science standards and are designed to introduce geology, oceanography, meteorology, and solar system astronomy. It includes the study of earth materials, geologic history, ocean basins and coastlines, weather and climate, pollution and earth resources, planetary geology, and the scientific method. The laboratory component includes study of rocks, maps, scientific instruments, earthquakes, and local geologic features. Note: Geology 6 is not designed for Geology or Earth Science majors.

Conditions of Enrollment:

Prerequisite:

Co-requisite:

Recommended Preparation:

English 1 or eligibility for English 1A or qualification by appropriate

Enrollment Limitation:

Course Length: Full Term

Hours Lecture (per week): 3

Hours Laboratory (per week): 3

Outside Study Hours:* 6

Total Hours:* 108

Course Units:* 4

Grading Method:

Letter Grade only

Credit Status:

Credit, degree applicable

Transfer CSU:

Yes
 No

Effective Date: 5/21/2001

Transfer UC:

Yes
 No

Effective Date:

General Education ECC:

Area 1 - Natural Sciences

Term:

Other:

CSU GE:

Area B1 - Physical Universe and its Life Forms: Physical Science

Area B3 - Physical Universe and its Life Forms: Laborator Activity

Term: Fall 2002/Fall 2009

Other:

IGETC:

Term:

Other:

IX. Outcomes and Objectives

A. Student Learning Outcomes SLOs (The course student learning outcomes are listed below.)

Student Learning Outcomes:**SLO #1 Basic Knowledge**

Students can identify the salient features of the basic concepts of geology. (This includes the ability to recall the definitions of the specialized vocabulary of geology.)

SLO #2 Relationship with Their Environment

Students recognize and can accurately articulate how the Earth affects humans' lives and how human activities affect the Earth.

SLO #3 Nature of Science

Students can identify the key elements of the scientific method (hypotheses, tests, observations, conclusions/interpretation of observations) in popular accounts of scientific research in magazines, newspapers, etc.

B. Course Objectives (The major learning objectives for this course are listed below.)**Course Objectives:**

1. Understand matter: atoms, molecules, chemical bonding, crystals, and minerals.
2. Explain the major concepts of physical geology, including rocks and minerals, geologic time, plate tectonics, geologic structures and weathering.
3. Demonstrate knowledge of concepts of oceanography, including ocean basins and oceanic crust, sediments, oceanic ridges, trenches and island arcs, coastal processes, and ocean circulation, waves, and El Niño, and tides.
4. Demonstrate competence in meteorology, including atmosphere, weather and storms, global climate, and global climate change
5. Explain basic concepts of lunar and planetary, and solar system geology and astronomy.
6. Identify earth resources and hazards, and effects of human activities on the earth, its resources, and environment; contribution of earth science to public affairs and decision making.
7. Explain the scientific method; how scientists operate; nature of scientific revolutions.
8. Demonstrate teaching techniques on how to teach earth science to students, and how to use earth science as a vehicle for teaching children how science works and what science is.
9. Utilize websites, such as the US Geological Survey's earthquake site, NASA, SCEC, for classroom instruction.

X. Outline of Subject Matter

(Topics should be detailed enough to enable an instructor to determine the major areas that should be covered to ensure consistency from instructor to instructor and semester to semester.)

Example:

- I. Main Topic (3 hours, lecture)
 - A. Sub topics
 - B. Sub topics
 - 1. Super sub topic
 - 2. Super sub topic

Major Topics:

I. Introduction to Course (3 hours, lecture)

1. Present an overview of Earth Science
2. Discuss the dynamic Earth
3. Describe the Principle of Uniformitarianism
4. Describe the Scientific Method

II. Laboratory: Principle of Uniformitarianism (3 hours, lab)

1. Examine geologic specimens and speculate as to their nature and origin.
2. Apply the Scientific Method to the study of the Principle of Uniformitarianism and a variety of geologic specimens.

III. Geologic time (3 hours, lecture)

1. Discuss the Principles of relative dating, unconformities, fossils and faunal succession and correlation
2. Discuss absolute dating and the geologic time scale.

IV. Laboratory (3 hours, lab)

1. Identify major Plate tectonic features on Earth and answer questions regarding their nature and origin.

V. Plate tectonics (4 hours, lecture)

1. Discuss plate boundaries, evidence for plate boundaries, and how plates interact with each other.
2. Describe convection as the mechanism of plate tectonics.

VI. Laboratory (3 hours, lab)

1. Understand the changes of continents and oceans through time by using computer-generated reconstructions of plate motions through earth history.
2. Discuss the importance of Pangaea.

VII. Earthquakes (4 hours, lecture)

1. Describe the origin and mechanisms for earthquakes.
2. Discuss the causes of damage from earthquakes and human interactions with earthquakes.

VIII. Laboratory (3 hours, lab)

1. Study earthquakes and their relationship to the San Andreas Fault.
2. Calculate and plot an earthquake epicenter.
3. Diagram and calculate plate motions along the San Andreas fault.

IX. Interior of the Earth (3 hours, lecture)

1. Composition

2. Structure

X. Laboratory (3 hours, lab)

1. Identify fossils and how they are used to determine geologic time.
2. Examine the principles of relative age dating.
3. Examine geologic structures such as the different kinds of faults and folds and interpret their timing and origins.
4. Use the Geologic Time Scale to assign ages to a variety of fossils.
5. Calculate absolute ages for geologic materials using a variety of radiometric age dating techniques.

XI. Volcanoes (3 hours, lecture)

1. Discuss the nature and origin of volcanoes.
2. Distinguish 2 major categories of volcanoes and their occurrences.
3. Connect volcanic eruptions with their impacts on humans

XII. Laboratory (3 hours, lab)

1. Examine samples from different types of volcanoes.
2. Correlate the samples with their volcanic origin.
3. Study the geographic relationship between different types of volcanoes and their plate tectonic setting.

XIII. Mountains (3 hours, lecture)

1. Identify and discuss the different types of mountains and their mechanisms of formation.
2. Identify the components of the mountains in the western United States.

XIV. Laboratory (3 hours, lab)

1. Identify minerals and their diagnostic physical properties.
2. Use the diagnostic physical properties of minerals to identify them within rocks.

XV. Rivers (3 hours, lecture)

1. Discuss how rivers and floods influence the surface of the Earth.
2. Discuss the interactions of rivers and humans.
3. Examine the nature and origin of groundwater and the importance of groundwater for human needs.

XVI. Laboratory (9 hours, lab)

1. Identify the common igneous, sedimentary and metamorphic rocks.
2. Connect the rocks to their environments of formation and deposition.

XVII. Mass Wasting (3 hours, lecture)

1. Discuss how mass wasting affects humans and where they live.
2. Discuss the different types of mass wasting and where and why they occur.

XVIII. Laboratory (3 hours, lab)

1. Examine and identify the components of samples of sand from a variety of different locations in order to understand their nature and origin.

XIX. Deserts (3 hours, lecture)

1. Discuss the nature and origin of deserts.
2. Describe the major features found in deserts and how they form.
3. Discuss the nature and origin of glaciers and how their formation and destruction is related to climate change.
4. Discuss how formation and melting of glaciers affects global changes in sea level.

XX. Laboratory (3 hours, lab)

1. Identify important features of deserts and glaciers on maps.
2. Understand stages in formation of desert features.
3. Identify landscape features that indicate the surface effects of glaciers at the present time and features that indicate that glaciers were once present.

XXI. Atmosphere (6 hours, lecture)

1. Discuss the atmosphere and how it operates.
2. Discuss weather and climate, weather systems and atmospheric moisture, storms, winds, Coriolis Effect, and atmospheric circulation.
3. Describe the heat budget of the earth.
4. Describe the formation of hurricanes and how they are related to the ocean.

XXII. Laboratory (9 hours, lab)

1. Travel to the coast to investigate beach processes such as the shape of the beach, longshore drift, how different types of coastal materials (rocks and sand) interact with the ocean.
2. Study seacliff erosion and its impact on human-made structures.
3. Investigate the formation of marine terraces.
4. Study how waves travel across the ocean, their shapes and sizes, and how they impact the coast.
5. Study coastal landforms such as the beach, dunes, seacliffs, and wetlands to understand the interaction of the ocean and the coast.
6. During classroom laboratory activities investigates the nature and origin of waves and tsunami, their formation, shapes, sizes, and how they interact with the coast.
7. Observe how tides operate along the coast.
8. Use oceanographic instruments to study seawater.

XXIII. Coast (3 hours, lecture)

1. Discuss features of the coast and how they change through time.
2. Discuss how beaches change according to the seasons.
3. Discuss and describe longshore transport of sand.
4. Describe how human-made structures affect processes along the coast.

XXIV. Laboratory (3 hours, lab)

1. Study how groundwater moves through different kinds of rocks and geologic structures.
2. Use a model to study groundwater flow through an aquifer and not through the aquiclude.
3. Examine maps to calculate how human-made point-source pollution contaminates the groundwater.
4. Investigate the relationship between groundwater and streams.
5. Use a stream table to study how rivers are formed and change through time.

XXV. Ocean (4 hours, lecture)

1. Discuss components of ocean circulation such as the connection between the Coriolis Effect, winds and gyres and currents.
2. Discuss how waves are formed and how they interact with the coast.
3. Discuss the nature and origin of El Niño and La Niña and their effects on weather and climate.
4. Describe the mechanism for tides.
5. Discuss the major features found on the seafloor that are due to plate tectonics.
6. Discuss the nature and origin of sediments in the ocean and how they are important to humans.

XXVI. Laboratory: Astronomy (3 hours, lab)

1. Examine images of the sun, planets and the moons and investigate their nature and origin.
2. Study images of the surface features of the planets and moons and use geologic principles to determine their origins.
3. Study images of the Milky Way galaxy, other galaxies, and stars to understand their nature and origin.
4. Examine different kinds of telescopes to study how they operate.

XXVII. Astronomical Effects (5 hours, lecture)

1. Discuss the connection between tides and the phases of the moon.
2. Discuss the nature and origin of the moon and its major components visible from planet Earth.
3. Discuss the nature and origin of the planets in the solar system, including other bodies that are present.
4. Discuss the place of the solar system within the Milky Way galaxy and the universe.

XXVIII. Human Impacts (4 hours, lecture)

1. Discuss human impacts on planet Earth, climate change and global warming and environmental damage.
2. Identify earth resources and hazards, and the effects of human activities on the Earth, its resources, and environment.
3. Discuss the contribution of Earth Science to public affairs and decision making.
4. Discuss causes of climate change and global warming, both natural and human

induced, and their relationship to human activities.

XXIX. Laboratory (3 hours, lab)

1. Investigate basic physical principles applied to weather systems and atmospheric moisture and circulation.
2. Simulate the origin of a tornado, study how barometric pressure is measured and how wind speed is measured.
3. Utilize weather instruments to study the atmosphere.

Total Lecture Hours: 54

Total Laboratory Hours: 54

Total Hours: 108

XI. Primary Method of Evaluation and Sample Assignments

A. Primary Method of Evaluation (choose one):

Primary Method of Evaluation 1) Substantial writing assignments

B. Typical Assignment Using Primary Method of Evaluation

Typical Assignment Using Primary Method of Evaluation: Examine a list of damage from the Northridge earthquake in various localities and create an earthquake damage (Mercalli Scale) map. Highlight the areas with the greatest damage. In a one-paragraph essay, describe the relationship between earthquake intensity and distance from the epicenter? What is the relationship of the areas of greatest damage to low lying areas in Los Angeles County?

C. College-level Critical Thinking Assignments

Critical Thinking Assignment 1: Prepare a classroom presentation designed to explain shoreline processes to a fourth grade class. Be sure to include longshore drift, spits, baymouth bars, and breaking waves. This will be presented to our class.

Critical Thinking Assignment 2: Construct a lesson plan that integrates the California State Science Standards for a 5th grade class to present earthquakes in southern California. In a classroom presentation, teach the students how to calculate and plot the earthquake epicenter, and calculate the magnitude.

D. Other Typical Assessment and Evaluation Methods

Other Evaluation Methods:

- Class Performance
- Completion
- Essay Exams
- Fieldwork
- Homework Problems
- Laboratory Reports
- Matching Items
- Multiple Choice
- Other Exams
- Term or Other Papers
- True/False
- Written Homework

If Other: Portfolio project on local geologic site
 Field work - alternate site activities
 Short answer questions

XII. Instructional Methods

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

Instructional Methods:

- Demonstration
- Discussion
- Field trips
- Group Activities
- Lab
- Lecture
- Multimedia presentations

If other: Internet Presentation/Resources

XIII. Work Outside of Class

Work Outside of Class

- Answer questions
- Observation of or participation in an activity related to course content (such as theatre event, museum, concert, debate, meeting)
- Problem solving activity
- Required reading
- Study
- Written work (such as essay/composition/report/analysis/research)

If Other:

XIV. Texts and Materials

A. Up-to-date Representative Textbooks: (Please use the following format: Author, Title, Edition, Publisher, Year. If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.)

**Up-To-Date
Representative
Textbooks:**

Tarback and Lutgens. Earth Science. 11th ed. Pearson Prentice Hall, 2008.

Qualifier Text: Discipline Standard,

Herzig. Geology 6 Laboratory Manual. El Camino College, 2019.

Herzig. Geology 6 Lecture Notes and Workbook. El Camino College, 2019.

Owen, Pirie, Draper. Earth Lab: Exploring the Earth Sciences. 3rd ed. Brooks Cole, 2011.

Qualifier Text: This laboratory manual may be used or substituted by another one that is comparable in description.,

B. Alternative Textbooks: (Please use the following format: Author, Title, Edition, Publisher, Year. If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.)

**Alternative
Textbooks:**

C. Required Supplementary Readings

**Required
Supplementary
Readings:**

D. Other Required Materials

**Other Required
Materials:**

XV. Conditions of Enrollment

A. Requisites (Course Prerequisites and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

Requisite

Category

Requisite course:

Requisite and
Matching skill(s):
Bold the requisite
skill. List the
corresponding course
objective under each
skill(s).

B. Requisite: (Non-Course Prerequisite and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

Requisite:

Requisite and Matching skill(s):
Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable

C. Recommended Preparations (Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite course: English 1

Requisite and Matching skill(s):
Bold the requisite skill. List the corresponding course objective under each skill(s).

Students need well-developed reading skills in order to understand and interpret information in their textbooks and writing skills to develop essays and projects.

ENGL 1- Summarize, analyze, evaluate, and synthesize college-level texts.

ENGL 1 -Write a well-reasoned, well-supported expository essay that demonstrates application of the academic writing process.

D. Recommended Preparation (Non-Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite: Eligibility for English 1A or qualification by appropriate assessment

Requisite and Matching skill(s):
Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable

This course involves reading college level textbooks, developing projects, and answering essay questions. A student's success in this class will be enhanced if they have these skills.

Summarize, analyze, evaluate, and synthesize college-level texts.


Write a well-reasoned, well-supported expository essay that demonstrates application of the academic writing process.

E. Enrollment Limitations

Enrollment Limitations and Category:

Enrollment Limitations Impact:

STEP 2: Click  Save All Changes.

STEP 3: Launch proposal by clicking  in the top left corner of this page.

STEP 4: Click on the  at the top of the Proposal Toolbox to submit proposal for review.

STEP 5: When the "Your Decision" box appears, click Approve and "Make My Decision" to move the proposal forward in the process.

Course Created by: Joseph Holliday

Date: 11/01/2000

Board Approval Date: 02/20/2001

Last Board Approval Date:

Last Reviewed and/or Revised by: Charles Herzig

Date: 05/05/2020

Are these revisions minor or major? minor major

Acatalog Course Type:

TOP Code:

CIP Code:

SAM Code:

SOC Code:

Transfer Status:

Basic Skills:

UC Approval Date:

CSU Approval Date:

TCFEC Approval Date:

IGETC Approval Date:

**CSU GE Approval
Date:**