

# G 005: ENVIRONMENTAL GEOLOGY

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**Originator**

rburns

**Co-Contributor(s)****Name(s)**

Burns, Richard

**Justification / Rationale**

Making corrections suggested by curriculum committee and technical review.

**Effective Term**

Fall 2020

**Credit Status**

Credit - Degree Applicable

**Subject**

G - Geology

**Course Number**

005

**Full Course Title**

Environmental Geology

**Short Title**

ENVIRONMNTAL GEOLOGY

**Discipline****Disciplines List**

Earth Science

**Modality**

Face-to-Face

**Catalog Description**

This course surveys geologic hazards such as flooding, landslides, earthquakes, and volcanic eruptions that affect humanity and studies means by which they may be mitigated. Geologic resources such as groundwater, surface water, and soil are studied to assess supply, conservation practices, and contamination mitigation. Mineral, fossil fuel, and alternate energy resources are examined for potential and for environmental assessment of production and consumption. Land-use planning and environmental impact analysis integrate the foregoing. The laboratory portion applies, on a practical basis, aspects of the above in the classroom and in approximately 16 hours in the field. This course is suggested for students in any major which deals with human interactions with the physical environment, such as architecture, engineering, environmental studies, city planning, natural resources, geology, and geography.

**Schedule Description**

This class explores the geologic hazards humans face on the earth's surface and the issues that arise from our use of earth's resources. Advisory: ENG 001A & MATH 054 IGETC: 5A, 5C

**Lecture Units**

3

**Lecture Semester Hours**

54

**Lab Units**

1

**Lab Semester Hours**

54

**In-class Hours**

108

**Out-of-class Hours**

108

**Total Course Units**

4

**Total Semester Hours**

216

**Prerequisite Course(s)**

Advisory: ENG 001A &amp; MATH 054

**Required Text and Other Instructional Materials****Resource Type**

Book

**Author**

Edward Keller

**Title**

Introduction to Environmental Geology

**Edition**

5th

**City**

Upper Saddle River, New Jersey

**Publisher**

Pearson

**Year**

2012

**College Level**

Yes

**Flesch-Kincaid Level**

13.5

**ISBN #**

0321727517

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**For Text greater than five years old, list rationale:**

We have found this textbook provides more background information to the subject matter that was not achieved in other textbooks.

**Class Size Maximum**

28

**Entrance Skills**

Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.

**Requisite Course Objectives**

ENG 001A-Read, analyze, and interpret varied texts (e.g., literary, digital, visual).

ENG 001A-Identify and evaluate appropriate research sources, and incorporate them into essays through quotations, summaries, and paraphrases.

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**Entrance Skills**

Fully utilize a dictionary, thesaurus and other reference materials.

**Requisite Course Objectives**

ENG 001A-Write essays with arguable theses and evidence from different types of sources.

ENG 001A-Recognize and integrate creative elements of style (e.g., metaphor, analogy, voice, tone).

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**Entrance Skills**

Develop, organize, and express complex ideas in both expository and research papers.

**Requisite Course Objectives**

ENG 001A-Develop ideas coherently in writing through the drafting process.

ENG 001A-Write thesis statements, topic sentences, and ideas in an organized way in essays.

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**Entrance Skills**

Add, subtract, multiply, divide, and simplify rational expressions to solve geologic questions.

**Requisite Course Objectives**

MATH 054-Add, subtract, multiply and divide polynomials.

MATH 054-Add, subtract, multiply, divide and simplify rational expressions.

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**Entrance Skills**

Interpret the slope of the water table to understand groundwater flow.

**Requisite Course Objectives**

MATH 054-Solve rational equations that simplify to linear or quadratic equations.

MATH 054-Interpret the meaning of the slope of a line as a constant rate of change.

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**Entrance Skills**

Convert one type of map scale to another.

**Requisite Course Objectives**

MATH 054-Use variables to create algebraic expressions that model quantities in an application problem.

MATH 054-Use the properties of integer exponents to simplify algebraic expressions, including expressions involving scientific notation.

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**Entrance Skills**

Understand and use basic formulas from geometry including perimeter, area and volume.

**Requisite Course Objectives**

MATH 054-Add, subtract, multiply and divide polynomials.

MATH 054-Interpret the meaning of the slope of a line as a constant rate of change.

MATH 054-Use basic formulas from geometry to find perimeter, area and volume of basic figures.

MATH 054-Use dimensional analysis appropriately in applications.

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**Course Content**

1. Environmental Geology and human existence.
2. Earth origins and the Earth system.
3. Rock cycle.
4. Geologic time.
5. Plate tectonics.

6. Earthquakes and human activities.
7. Volcanoes and the environment.
8. Weathering and soils.
9. Landslides and mass wasting.
10. Subsidence and collapse.
11. Water cycle:
  - Water on land.
  - Groundwater.
12. Oceans and coasts.
13. Extreme climates, climate change, and the greenhouse effect.
14. Energy.
15. Mineral resources and society.
16. Waste management and geology.

### Lab Content

1. Minerals.
2. Rocks.
3. Topographic maps.
4. Geologic maps.
5. Seismic risk and earthquakes.
6. Volcanoes and eruptions.
7. Fluvial processes and forms.
8. Floods.
9. Coastal erosion.
10. Slope stability and mass movements.
11. Porosity, permeability, and fluid flow through rocks.
12. Groundwater.
13. Subsurface fluid withdrawal and ground subsidence.
14. Soil pollution.
15. Construction stone.
16. Petroleum and natural gas.
17. Coal.
18. Radioactive waste disposal.
19. Surface water pollution.
20. Groundwater pollution.
21. Acid rain.
22. Radon in the environment.

### Course Objectives

	<b>Objectives</b>
Objective 1	Analyze geologic hazards such as earthquakes, volcanic eruptions, mass wasting, and flooding to determine their effects on the works of man and evaluate methods for mitigation.
Objective 2	Evaluate environmental impacts of waste disposal methods, mining operations, energy production, water supply, and flood control and propose mechanisms for mitigation of these impacts.
Objective 3	Identify common minerals and rocks and evaluate them for resource, aquifer, and stability potential.
Objective 4	Analyze geologic features on topographic maps, such as stream valleys, fault zones, volcanoes, shoreline features, and mass wasting topography in the land-use planning process.
Objective 5	Summarize the environmental geology of the Coachella Valley and Salton Trough with particular emphasis on the San Andreas fault, geothermal and wind energy production, groundwater resources, flood control, and wastewater treatment.
Objective 6	Demonstrate an understanding of earth's climate, climate change and the greenhouse effect.
Objective 7	Demonstrate an understanding of the connectivity between the geosphere, biosphere, atmosphere, and hydrosphere.

**Student Learning Outcomes**

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

Outcome 1	Evaluate concepts, principles, and interactions of Earth's systems.
Outcome 2	Assess and describe how human activities impact Earth's environment.
Outcome 3	Assess and design how to mitigate and remediate geologic hazards and environmental issues.
Outcome 4	Evaluate and explain applications of the scientific method in environmental geology.

**Methods of Instruction**

Method	Please provide a description or examples of how each instructional method will be used in this course.
Laboratory	Practical hands-on work in lab in exercises and field trips with guidance from the instructor, including feedback, coaching, and evaluation.
Lecture	Lecture and demonstration utilizing slides, charts, minerals, and rocks with class discussion and feedback.
Activity	Collaborative learning in student groups to develop solutions to lab exercise and field trip problems.

**Methods of Evaluation**

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
College level or pre-collegiate essays	Required on homework, laboratory write ups, and tests.	In and Out of Class
Tests/Quizzes/Examinations	Short-answer and multiple-choice exams. Quizzes on canvas will be completed out of class.	In and Out of Class
Presentations/student demonstration observations	Evaluation of oral presentations.	In Class Only
Laboratory projects	Practical laboratory quizzes on minerals, rocks, and other geologic topics.	In Class Only
Written homework	Weekly assignments from textbook or other source.	Out of Class Only

**Assignments**
**Other In-class Assignments**

1. Identification of minerals and rocks
2. Analysis of textbook materials to summarize data for study-guide questions and in-class discussion and testing.
3. Make oral presentations in class

**Other Out-of-class Assignments**

1. Analysis of textbook materials to summarize salient data for study-guide questions and in-class discussion and testing.
2. Gather information of in-depth aspects of environmental geology to organize and interpret in research papers.
3. Preparation of in-lab work on exercises by review of lab materials.
4. Completion of assigned laboratory exercises.
5. Student research projects/oral reports of selected aspects of environmental geology to promote a deeper understanding of these aspects and to become familiar with the methodology of library/internet research and writing and speaking on geology topics.

**Grade Methods**

Letter Grade Only

**COD GE**

C1 - Natural Sciences

**CSU GE**

B1 - Physical Science  
B3 - Laboratory Activity

**IGETC GE**

5A - Physical Science  
5C - Science Laboratory

**MIS Course Data****CIP Code**

40.0601 - Geology/Earth Science, General.

**TOP Code**

191400 - Geology

**SAM Code**

E - Non-Occupational

**Basic Skills Status**

Not Basic Skills

**Prior College Level**

Not applicable

**Cooperative Work Experience**

Not a Coop Course

**Course Classification Status**

Credit Course

**Approved Special Class**

Not special class

**Noncredit Category**

Not Applicable, Credit Course

**Funding Agency Category**

Not Applicable

**Program Status**

Program Applicable

**Transfer Status**

Transferable to both UC and CSU

**General Education Status**

Not applicable

**Support Course Status**

Course is not a support course

**C-ID**

GEOL 131

**Allow Audit**

No

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

## Approvals

**Curriculum Committee Approval Date**

3/03/2020

**Academic Senate Approval Date**

3/12/2020

**Board of Trustees Approval Date**

5/15/2020

**Course Control Number**

CCC000267969

**Programs referencing this course**

Anthropology AA-T Degree (<http://catalog.collegeofthedesert.eduundefined?key=14/>)

Liberal Arts: Math and Science AA Degree (<http://catalog.collegeofthedesert.eduundefined?key=29/>)

Natural Resources AS Degree (transfer preparation) (<http://catalog.collegeofthedesert.eduundefined?key=71/>)