

## EES 220 Environmental Geology (3 cr.)

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**Course Description:** Environmental geology is the application of geologic information to the entire spectrum of interactions between people and the physical environment. In this course we will develop an understanding of geology's role in major environmental problems facing people and society.

**Optional Co-requisite:** EES 221 Environmental Geology Laboratory.

**Course Objective:** We live in a complex world that is both heavily dependent on natural earth resources for our standard of living and threatened by environmental hazards, natural and anthropogenic. It is more important than ever before that every citizen be informed about the role of earth resources and hazard mitigation for maintaining our society. An informed citizen is well prepared to make decisions at the personal level (e.g., deciding where you will live), local level (e.g., voicing concerns about zoning regulations), national level (e.g., contacting Congressional leaders about the opening of public lands to mining), and global level (e.g., contacting Congressional and United Nations leaders regarding global warming and the global water crisis). Consequently, the objective of this course is to help you become an informed citizen who understands

- the basic concepts, principles, and tools of environmental geology,
- the role earth resources and geologic hazards play in our society,
- the occurrence, distribution, and availability of earth resources and potential negative environmental consequences of their use,
- the natural processes and human activities that can lead to natural hazards and disasters,
- the principal laws and regulations governing resource utilization and hazard mitigation, and
- how to apply this knowledge to practical situations.

**Liberal Arts Core Curriculum:** This course fulfills the Tier II requirement for the Natural Sciences category. As such the course will help you to

- evaluate the quality of scientific data and its interpretation in published studies,
- acquire and synthesize data needed to apply science to the needs of society
- apply scientific methods and knowledge in making and evaluating decisions in human affairs,
- recognize the limitations of science in addressing certain societal problems
- apply ethical principles to practical problems of life and work,
- effectively communicate ideas orally, visually, and in writing,
- develop the ability to think critically, and
- effectively seek and employ information to achieve academic goals.

**Course Format:** This is an on-line course. Consequently, we will not meet in a traditional classroom. Instead, you will use the required texts, the Resource CD-ROM, and the Internet, and

you will interact with the instructor and your classmates through Blackboard Vista.

The course consists of a sequence of modules. The first module will introduce you to environmental geology and the course Blackboard site. The remaining modules will cover specific topics in environmental geology, such as water resources, mineral resources, earthquake hazards, and coastal hazards. Each module will consist of required readings, a discussion posting on the reading, and an assignment that helps you apply what you have learned. These applications will include accessing and using pertinent websites (such as the on-line soil survey site, FEMA's flood hazard map site, and Virtual River and Virtual Earthquake sites) and the Hazard City CD-ROM (consisting of assignments evaluating the resources and hazards of a virtual city). You will report your work using various modes of communication, including e-mail, discussion groups, and uploading assignments. Three exams will be given on-line.

To receive credit for a discussion posting, answer at least one of the questions left unanswered by your classmates: give the question number in the subject line, write out the question, provide your answer in your own words—plagiarism will not be tolerated—and identify the source(s) you used. If all the questions have been answered, add to your classmates' answers for at least 3 questions. Review your classmates' answers and add your comments. Substantial additions may earn you extra credit. Revisit the postings often to see updates. If I ask you to add to or correct your answer, you must do so within a week to receive credit.

The course assumes no previous background in geology. However, all students must be competent users of computers, computer software (e.g., word processing, Adobe Acrobat Reader), e-mail, and the Internet. Some students using Macs have encountered problems with some of the websites and materials used in this course, consequently, access to a PC is highly recommended. High-speed Internet access is required to access some course materials. Libraries often provide this service to the public on a limited basis. IF YOU DO NOT HAVE ACCESS TO HIGH-SPEED INTERNET SERVICE ON EVEN A TEMPORARY BASIS, YOU SHOULD NOT TAKE THIS COURSE.

**Responsibilities of On-line Learners:** As an on-line learner, you will be responsible for determining the pace and schedule of your work. You may complete the readings and assignments at any times that are convenient to you as long as your work is submitted before the assignment deadline (Late work is not accepted without prior approval by the instructor and only for extreme situations). You must also take the on-line exams within the specified time frames.

Although you may be located many miles from Eastern Connecticut State University, you are expected to have frequent contact with your instructor and classmates via e-mail and the on-line discussion board. You may also use the on-line discussion board to ask questions, offer comments, and obtain advice/assistance from your instructor and classmates.

If you are coming into this course thinking that on-line study is an easy way to earn to three credits, think again. On-line study requires more initiative and self-discipline than an on-campus course. Be prepared to spend a significant amount of time completing this course. When you take an on-campus course, you spend about 45 hours in the classroom. In addition, you should spend an even larger amount of time outside of the traditional class time reading, completing assignments, and studying for exams—approximately 2 additional hours for every hour in class (collegiate standard). An on-line course requires the same time commitment.

The key to success is self-motivation and perseverance. **Set work hours each day and stick to them—put them into your appointment book.** Learning at home requires much more dedication than learning on-campus, where you count on the instructor to keep you on track. This course allows you great flexibility as long as you meet the inflexible deadlines. The amount of time needed to complete a module will vary from module to module. In general, you will be given a week for each module. Deadlines are noted on the syllabus; any updates on Blackboard Vista Calendar.

**Required Texts:**

- Minerals - Foundations of Society 3rd ed. (ISBN 0-922152-60-8)
- Petroleum and the Environment (ISBN 0-922152-68-3)
- Hazard City: Assignments in Applied Geology, 3/E (ISBN: 0-13-156682-2)
- Mineral and Rock kits (available through ECSU bookstore)
- Custom Course Packet (provided on loan from the EES department)

*The Custom Course Packet is provided on loan from the Environmental Earth Science (EES) Department and may be obtained from the EES departmental secretary. You may keep the Resource CD, but all other materials must be returned or you will receive an Incomplete for your semester grade.*

**Grading:** I do not grade on a curve. Therefore, it is theoretically possible for the whole class to get an A or an F.

Discussion	17%
Assignments	50%
<u>Exams</u>	<u>33%</u>
Total	100%

A	90%	B-	77%	D+	64%
A-	87%	C+	74%	D	60%
B+	84%	C	70%	F	<60%
B	80%	C-	67%		

**Cheating and Plagiarism Policy:** Refer to the ECSU Academic Integrity policy. Cheating and plagiarism are serious offenses, and **IGNORANCE OF WHAT CONSTITUTES CHEATING AND PLAGIARISM IS NOT AN ACCEPTABLE EXCUSE.** It may be tempting to copy and paste from the Internet, but doing so will not be tolerated.

**Disability Notice:** If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact the Office of AccessAbility Services at 465-0189. To avoid any delay in the receipt of accommodations, you should contact the Office of AccessAbility Services as soon as possible. Please understand that I cannot provide accommodations based upon disability until I have received an accommodation letter from the Office of AccessAbility Services. Your cooperation is appreciated.

**Course Topics:** The modules are described below.

Module (tentative due date)	Topic	Description
1 (Feb. 2)	Introduction	General introduction to environmental geology, the rock cycle, and reading topographic maps. We will use the National Topographic Map (online) to produce a map.
2 (Part 1: Feb. 9) and (Part 2: Feb. 17)	Water Resources (2-part module)	Water is the most important earth resource, necessary for drinking water, agriculture, industry, transportation, and so forth. Water distribution, availability, quality, and management will be covered with special attention to surface water (streams, lakes and reservoirs), groundwater (aquifers and well yields), and surface-water/groundwater interaction. We will visit the EPA Watershed Academy (online) and investigate surface-water and groundwater contamination at Hazard City.
3 (Feb. 23)	Soil Resources	Soil is an essential natural resource that is often taken for granted. We grow food, fiber, and lumber in soil; we build our homes, businesses, and roads on soil; and soil serves as a filter protecting water resources. We will cover basic information about soils, the many uses of soil, environmental concerns, and ways of restoring, managing, and sustaining soil resources. We will use the NRCS Web Soil Survey (online) to make a soil map and investigate soil characteristics and uses.
4 (Mar. 2)	Mineral Resources	Minerals are essential for individual and national well-being (i.e., standard of living) and security. Mineral significance, origin, distribution, identification, and the role of minerals in the U.S. economy and foreign relations will be covered. We will identify 10 common minerals using a mineral identification key.
(Mar. 4)	Exam 1	Covering modules 1-4
5 (Mar. 11)	Geologic Foundations	We will take a closer look at the fundamental theory of geology—plate tectonics--and its relation to the rock cycle. In addition, we will learn how geologic maps serve as a tool for understanding the Earth and for solving practical problems. We will identify 10 common rocks using rock identification keys.

<p>6 (Mar. 18)</p>	<p>Mining</p>	<p>Metal and aggregate resources are vital to our way of life. Mining and processing of natural resources is necessary to support our current lifestyle and standard of living. We will explore rock identification, mining/processing methods, environmental concerns, policies and regulations, and management approaches related to providing these resources. We will use the USGS Mineral Resources online map to investigate local mining operations.</p>
<p>7 (Part 1: Apr. 1) and (Part 2: Apr. 8)</p>	<p>Energy Resources (double module)</p>	<p>Energy resources of coal and petroleum supply electricity, heating, and the means of transportation (e.g., gasoline). In addition, these resources provide the raw materials for other commodities, such as plastics, pharmaceuticals, chemicals, and asphalt. We will explore the distribution and availability of these non-renewable resources, as well as the environmental and economic impacts of extraction and utilization. An alternative energy resource, geothermal energy, has many advantages over coal and petroleum. We will investigate the occurrence and utilization of geothermal energy. We will assess the value of a coal seam near Hazard City (HC).</p>
<p>(Apr. 10)</p>	<p>Exam 2</p>	<p>Covering modules 5-7</p>
<p>8 (Apr. 15)</p>	<p>Flooding Hazards</p>	<p>Floods are the most common natural hazards worldwide and the most costly natural hazards in the United States. In this module we will explore the natural stream processes that result in natural disasters and catastrophes when humans build and live in the path of these natural processes. We will investigate ways of predicting floods and protecting life and property by best management practices. We will investigate flood flows using an online interactive module (Virtual River), assess local flood risk using FEMA's online flood maps, and estimate flood insurance costs in Hazard City.</p>
<p>9 ( Apr. 22)</p>	<p>Landslide and Volcanic Hazards</p>	<p>Landslides occur in response to natural processes that become hazards when humans build and live in landslide prone areas. The different types of landslides, the conditions under which they occur, the triggers that initiate them, management techniques to mitigate and minimize landslide hazards, and landslide monitoring and warning systems will be covered. We will investigate landslide hazards near Hazard City.</p>

<p>10 ( Apr. 29)</p>	<p>Earthquake Hazards</p>	<p>Earthquakes commonly occur in tectonically active, and formerly active, areas. In addition, human activities can induce earthquakes. This module will cover the distribution, magnitude, and frequency of earthquakes; the hazards associated with earthquakes; approaches to minimizing earthquake damage; and earthquake monitoring and warning systems. We will investigate how to determine earthquake epicenters and magnitudes using the online interactive module (Virtual Earthquake), and we will investigate the damage resulting from an earthquake near Hazard City.</p>
<p>11 (May 6)</p>	<p>Coastal Hazards</p>	<p>Over half the U.S. and world population now lives in coastal areas, placing considerable stress on these coastal environments. Common perception is that coasts are static, stable environments, when in actuality they are dynamic and constantly changing. These misconceptions lead to poor utilization of coastal resources, resulting in unnecessary hazards and environmental degradation. This module will cover the natural processes operating in coastal areas, the negative effect of human activities, best management practices, and the challenges of managing coastal resources in the face of conflicting uses. We will investigate coastal hazards near Hazard City.</p>
<p>12 (May 13)</p>	<p>Waste Management</p>	<p>Among the consequences to any consumer society that embraces the “throw-away” lifestyle is the gargantuan problem of waste disposal. Safe disposal of waste, whether it be municipal, hazardous, or radioactive, requires careful consideration of the hydrologic cycle, soils, rocks, and geologic hazards of the proposed disposal site. In this module, we will explore best management practices for disposing of various types of waste and the regulations that are in place to ensure public safety. We will assess various proposed landfill sites near Hazard City and make a recommendation of the most suitable site.</p>
<p>(May 20)</p>	<p>Exam 3</p>	<p>Covering modules 8-12</p>