SEMESTER AT SEA COURSE SYLLABUS
University of Virginia, Academic Sponsor

Voyage: Fall 2015
Discipline: Environmental Science
EVSC 3559: Earth's Processes as Natural Hazards
Division: Upper
Faculty Name: Alan Goldin
Credit Hours: 3; Contact Hours: 38

Pre-requisites: College geology or physical geography course or permission of the instructor

COURSE DESCRIPTION Studies the dynamic processes of Earth's interior and consequent effects on surface processes and the impact of natural hazards on society. Geology of natural hazards in the environment, such as volcanoes, landslides, earthquakes, mass wasting and landslides, subsidence, weather, and tsunami will be examined in class and on field excursions.

COURSE OBJECTIVES The primary purposes of this course are to provide students with an understanding of geologic hazards and how these become hazards. The following three objectives support these purposes:

1. Understanding the causes and effects of natural hazards, particularly earthquakes, volcanoes, floods, landslides, and tsunami.

2. Familiarization with plate tectonics, diastrophism and volcanism and their varied actions and surface and subsurface configurations.

3. Familiarization with the relationship between subsurface geologic phenomena and their surface expression as well as atmospheric influences on surface processes.

REQUIRED TEXTBOOKS

AUTHOR:	David M. Best and David B. Hacker
TITLE:	*Earth's Natural Hazards: Understanding Natural Disasters and Catastrophes*
PUBLISHER:	Kendall Hunt
ISBN #:	978-0-7575-7619-5
DATE/EDITION:	2010 First Edition
COST:	Amazon cost $60

AUTHOR:	Bruce A. Bolt
TITLE:	*Earthquakes: 2006 Centennial Update*
PUBLISHER:	W.H. Freeman and Company
ISBN #:	0716775484
DATE//EDITION:	2005
COST:	Amazon cost $44

TOPICAL OUTLINE OF COURSE

Class	Topic	Questions to Be Addressed	Reading
B1-2	Earth Hazards	What conditions make a natural event a hazard? What are the relationships between humans and "This	B&H: ch1

		Dynamic Planet?" What have humans done to increase the frequency and severity of natural hazards? Are any disasters beneficial to humans? How can we use geology and human history to assess these threats to life and property?	
B3-5	Plate Tectonics, Rock Cycle Other Earth Cycles	What is science? What is scientific theory? How was Plate Tectonics developed as a scientific theory? How did it unify geological thought? What are the different types of rocks and how do they form and relate to each other and Plate Tectonics? What other cycles are significant?	B&H: ch2; B: ch7 Br: ch 12
B6-8	Volcanoes	How do volcanoes form? What are the types of volcanoes? How does each type influence eruption characteristics, and the types of activities (lava flows, pyroclastic flows, mudflows, etc.)? Are these types predictable based on plate tectonics? Why are they a hazard? What are some historical impacts on humans? What methods are used to predict volcanic eruptions and minimize the hazard?	B&H: ch 3; B: ch9, 182-194; D&D: 2,4,7,9, 17,18 Br:ch 15
B9-11	Earthquakes	Is there a predictable location for earthquakes (i.e., earthquake belts). Is this related plate tectonics What are geologic faults and how do these impact earthquakes? How is the magnitude of an earthquake determined? What are the types of earthquake waves and how do their properties affect ground motion? How is seismic risk estimated? What are the effects of earthquakes? How does an earthquake produce a tsunami? What are the components of an earthquake cycle? What are the methods that help us potentially predict earthquakes? How do people adjust to or perceive the earthquake hazard? How can humans induce earthquakes?	B&H: ch4; B: 1,2,3,4, 5,6,8, 10,11, 12; Br: ch 14
B12-14	Landslides and subsidence; Groundwater	What are the slope processes that cause slope failure? What driving and resisting forces affect slope stability? How do such factors as vegetation, slope steepness, topography, water, geology, and soils affect the incidence of landslides? How do humans affect the risk of landslides, particularly buildings and road construction? How do we prevent landslides? What causes subsidence and how do we prevent this? What is the relationship between groundwater, surface water, soils, and bedrock? What are the processes by which groundwater and surface water move?	B&H: ch 5
B15-16	Tsunami	How do tsunami differ from standard waves? How do they propagate? How do earthquakes and volcanoes cause tsunami? What are some historical tsunami?	B&H: ch6; D&D 195-209
B17-19	Extraterrestrial effects	What are the differences among a meteor, a comet, and a meteorite? What is the relationship between the Big Bang, the Solar System, and the Age of the Universe? What is the difference between the inner and outer planets? Why are relatively few impact features on Earth well-preserved? What is the significance of Comet Shoemaker-Levy? What	B&H: ch7 Br: ch 13

		is the significance of the Chicxulub impact crater in Yucatan, Mexico?	
B20-22	Rivers and Flooding	How do streams form? What are the influences of groundwater and precipitation to stream formation? What is the morphology of a stream and watershed and how do these affect flow? What conditions cause rivers to flood? How can we predict these? What is the influence of land use on flooding? How does urbanization influence flooding and flash floods? What is the impact of floods on life and property? How do other human practices affect flooding (logging, channelization, etc.)	ch 9
If time	Global Climate, Hazardous Weather, Hurricanes	What are ocean waves and how do they propagate? What are the basic beach characteristics? How does sediment move along the beaches? What are rip currents and why are they hazards? What are the processes of coastal erosion? What engineering approaches are used to protect the shoreline? How does human activity affect the shoreline? What are tropical cyclones and how do they affect the beaches? How do tsunami affect beaches and human property? What are hurricanes and how do they form? What are the risks and how do we minimize them?	Ch 10

FIELD ASSIGNMENTS

Our field trip will visit Mount Vesuvius, and the historical surrounding devastation in Pompeii from volcanic hazards. We will also examine alluvial hazards by examining ancient towns buried by alluvial sediments during the fifth and third centuries BC and again between the sixth and seventh centuries AD, especially in the ancient town of Velia in Cilento Region about 100 miles south of Naples. Along the way we will examine features and/or evidence of flooding, landslides, subsidence, earthquakes, volcanoes, coastal processes, and surface water or groundwater contamination, and other possible geologic hazards. You will be required to collect at least ten data points, each of which has a minimum of lat-long if possible, a photo, and a brief description. Five of the data points should have a lengthy, thoughtful entry (two pages or so) in your course journal analyzing what you see environmentally. At least two of these points should have some research linked to it from the web or the library or from on-the-trip discussions with experts. Make sure you document your sources. Grades will be assigned based on the percentage of points collected (30% of grade), your images (30%), and the quality of your write-up of observations (30%). Your participation is worth 10% (active participation → 10 points, moderate about 7, and on down to none for 0 points (just going along for the ride) The paper should indicate what you saw, what you learned, and what the geological significance is. We will use this trip in future class discussions and therefore information may be on exams.

METHODS OF EVALUATION

1. Four exams will be given: B6, B11, B18, and the cumulative exam on Finals Day. The three mid-semester exams are 50 minutes and the final is 75. These exams will be a combination of multiple choice, problems, and essay. All exams will cover only material discussed since the previous exam, except as new material relates to previously tested material. The last exam will be cumulative and will be an open book taken on Finals Day. NO (repeat, No) make-up exams will be given. The lowest grade of the three mid-semester exams will be dropped. Exams will include questions from lecture, homework, map interpretation and field exercises.

2. Quizzes will be given approximately every second class to make sure you are keeping up with the readings and lectures. Each quiz will take about 15 minutes of class time. They will all be short answer.

3. Provide a scrapbook of 20 photos of geologic hazards (volcanoes, caves, earthquakes, etc.) from newspapers, magazines, travel brochures, etc. Do not use geologic or related professional journals, such as *Scientific American*. Write a caption two to five sentences in length that explains the event and how this event could have happened based on what we learned in class. The name and date of the newspaper/magazine must be provided. Getting a newspaper in each port to do this is strongly encouraged to get variety in your work and to keep you actively pursuing your goal. Paper or internet copies of the newspaper are permitted (the local newspaper or its internet counterpart). You absolutely cannot just google "volcano" and use an image of a volcano. Due date is no later than noon on December 1 (B19). To avoid waiting until the last minute, two scrapbook pages (photos with captions) will be due about three weeks before at B13 on November 10 and will count 10% of the scrapbook grade. You can also use some of your own photographs, but no more than one per port. Collection of these images is part of your field assignment.

4. Homework assignments will be done as assigned. Ten will be required and worth 20% of your grade.

5. Attendance is worth 6% of your grade and participation 4%. If you attend 22-24 classes, you will receive all six attendance points, 20-21 is five points, 18-19 is four points, 16-17 is three points. If you attend less than 16 classes, you will receive no attendance points. Each day you will be evaluated on your participation. You will receive a 3 for the day if you are actively engaged, a 2 if you have some participation and 1 if little or none and a 0 if you don't attend class. If your average score >2.5, you will receive all 4 points, 2-2.49 three points, 1.50-1.99 two points, 1.0-1.49 one point, <1.00 no points. It is also your responsibility to sign in for class each day as well as to deliver ALL assignments on time. Lateness of delivery will result in a 10-point grade loss immediately after class ends and for each 24 hours thereafter.

6. Be sure to check our web folder regularly. I will communicate with you in this fashion outside of class.

--> GRADE DETERMINATION:

Three of four exams (11%,11%,16%)	38%
Class quizzes	10%
Scrapbook	12% (2% and 10% for the two pieces)
Shipboard assignments	10%
Field Work assignment	20%
Attendance (6%), participation (4%)	10%

RESERVE LIBRARY LIST

AUTHOR:	Bryson, Bill
TITLE:	A Short History of Nearly Everything
PUBLISHER:	Broadway or any other edition
ISBN #:	0307885151
DATE/EDITION:	2010 – any edition
COST:	**$20**

AUTHOR:	Decker, Robert & Barbara Decker
TITLE:	Volcanoes
PUBLISHER:	W.H. Freeman and Company
ISBN #:	0716789299
DATE/EDITION:	2005 – fourth edition
COST:	**$55**

Examples of geologic scrapbooks

ELECTRONIC COURSE MATERIALS

None presently

ADDITIONAL RESOURCES: Films

Riding the storm: Landslide Danger in the San Francisco Bay Area
In the Path of a Killer Volcano
Krakatoa
The Day the Mesozoic Died

HONOR CODE

Semester at Sea students enroll in an academic program administered by the University of Virginia, and thus bind themselves to the University's honor code. The code prohibits all acts of lying, cheating, and stealing. Please consult the Voyager's Handbook for further explanation of what constitutes an honor offense.

Each written assignment for this course must be pledged by the student as follows: "On my honor as a student, I pledge that I have neither given nor received aid on this assignment." The pledge must be signed, or, in the case of an electronic file, signed "[signed]."

Geology Scrapbook Assignment

Scrapbook Items: Over the course of the semester collect news articles, postcards, photos, travel brochures, advertisements and other images that illustrate one aspect or another of geology as indicated in our textbook. You cannot use textbooks and other prepared curriculum material, including those found on government or university web sites. Also off-limits are geology and other scientific literature, such as *Scientific American, National Geographic,* and *Discover.* Electronic images are not permitted unless they are in a news article or a personal photo.

Caption: Each item must have a caption that contains the following: 1) geology content information (pretend you are explaining what the item depicts to a friend who knows no geology, 2) information about the source of the item. To determine the content, ask yourself, "What do I see?" When You answer the question, brainstorm what you have learned about that formation or object. A newspaper article may have a caption, but it won't be geologically based. For example, they may show earthquakes damage in Turkey, but they won't tell you about Turkey's location relative to a plate boundary and what tectonic processes probably caused the quake. An article may focus on the plants or animals in a swamp, but it won't discuss the geologic sedimentary environment and what type of rock will form there and why.

Organization and Binding:
The scrapbook must be organized into sections by type, even if there is only one item in a topic. Each caption must be numbered to facilitate my counting. You may put your captions on the items or separately, but if the latter, both caption and item must be numbered. You can use a scrapbook, composition book, loose-leaf binder, or any other binding system that you like. There must be no loose items.

Grading Guide:

Criterion	A	B	C
Number of captioned items (15%)	20	17	14
Variety (20%)	at least 6 topics * 4 or more sources**	at least 5 topics * at least 3 sources **	at least 4 topics * at least 2 sources**
Percent of content correct (25%)	90%	70%	50%
Quality of content (35%)	Geology content information unfamiliar to lay persons is applied to each item, in many cases caption includes information about geologic processes. Caption is in student's own words and it is clear that ideas have not been cribbed from item's source.	Geology content information unfamiliar to lay persons in applied to each item, in some cases caption includes information about geologic processes. Caption is in student's own words.	Two thirds of the captions include geology content unfamiliar to lay persons. Caption is in student's own words.
Professionalism of presentation (5%)	Items are neat and aesthetically presented, organized by topic, captions typed, all items are fully referenced.	Items are neat, most items are referenced, captions are typed.	Captions are legible, most items are referenced, some items missing parts of references.

* Examples of topics: volcanism, soils, earthquakes, geologic time, minerals, flooding
** Examples of sources: magazine ads, travel brochures, magazine articles, newspapers, personal travel photos, postcards, national park brochures
Note well: Scrapbooks handed in late (noon on B19 December 1 or after) will lose one grade for each day late. Scrapbooks that don't meet the criteria for a grade of "C" will be given a grade of "F."
"In progress" scrapbooks handed in before B19 will be provided feedback.