EASTERN ARIZONA COLLEGE
Geologic Hazards and Disasters
Course Design
2016-2017

Course Information
Division Science
Course Number GLG 110
Title Geologic Hazards and Disasters
Credits 4
Developed by David Morris
Lecture/Lab Ratio 3 Lecture/3 Lab
Transfer Status

<table>
<thead>
<tr>
<th></th>
<th>ASU</th>
<th>NAU</th>
<th>UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLG 110 (3) &amp; GLG 111 (1)</td>
<td>Natural Science - General (SG), Global Awareness (G)</td>
<td>GLG 112L; Lab Science [LAB] -- and-- GLG 112; Science &amp; Applied Science [SAS]</td>
<td>GEOS 218; Tier 2 Natural Sciences (NAT2) --and-- GEOS Dept. Elective</td>
</tr>
</tbody>
</table>

Activity Course No
CIP Code 40.0601
Assessment Mode Pre/Post Test (100 Questions/100 Points)
Semester Taught Spring
GE Category Lab Science
Separate Lab Yes
Awareness Course Yes (GIH)
Intensive Writing Course No

Prerequisites
ENG 091 with a grade of “C” or higher or reading placement test score as established by District policy

Educational Value
This course meets the lab/science general studies requirement for graduation. Geology imparts a uniquely broad perspective that incorporates science with history and the development of civilization and culture. This course fulfills the Global/International/Historical Awareness (GIH) requirement.

Description
Geologic hazards and disasters (earthquakes, volcanoes, tsunami, meteorite and comet impacts, flooding, severe weather) are important processes in shaping the earth and human civilization. This course will acquaint students with the scientific principles governing these processes and their historic and future effect on society.
Supplies
None

Competencies and Performance Standards

1. Recognize and understand the importance of plate tectonics.

Learning objectives
What you will learn as you master the competency:

a. Identify the physical and chemical layers of the Earth and their boundary properties.
b. Explain the way in which different seismic waves respond to the different layers.
c. Describe the properties of the major plate tectonic boundaries.
d. Relate the effects of convection cells in the mantle with plate tectonic movement of the Earth's crust.

Performance Standards
Competence will be demonstrated:

- in objective tests
- through group presentations
- in lab assignments
- in written reports

Performance will be satisfactory when:

- learner describes the properties associated with each of the Earth's layers
- learner explains methods used by geologists to identify these various layers
- learner describes the evidence that supports the theory of plate tectonics

2. Examine the way earthquake hazards are identified and mitigated.

Learning objectives
What you will learn as you master the competency:

a. Explain the properties of P-waves, S-waves, and surface seismic waves
b. Identify areas in the world with intense earthquake activity related to plate boundaries
c. Describe the effects of historic earthquakes on human society
d. Describe the methods used to measure and predict earthquakes

Performance Standards
Competence will be demonstrated:

- in objective tests
- through group presentations
- in lab assignments
- in written reports

Performance will be satisfactory when:

- learner explains how and why earthquakes occur
- learner explains where earthquakes occur
- learner describes the relationship between earthquakes and plate tectonic boundaries
- learner explains the effects of historical earthquake activity
- learner explains methods developed to measure and predict earthquakes
3. **Explore the causes and effects of tsunami and the effects of tsunami on human society.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Learn the physical properties of tsunami.
   b. Identify geographic regions subject to high rates of tsunami activity.
   c. Describe the effects of tsunami on the natural environment and on society.
   d. Learn the processes used to detect tsunami and mitigate disaster.
   e. Learn about historic tsunami and their effects on society.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   - in objective tests
   - through group presentations
   - in lab assignments
   - in written reports

   *Performance will be satisfactory when:*
   
   - learner explains how and why tsunamis occur
   - learner explains where tsunamis occur
   - learner explains the relationship between tsunami, earthquake, and plate tectonic boundaries
   - learner explains the effects of historical tsunami activity
   - learner explains methods developed to measure and predict tsunamis

4. **Identify the cause of volcanic activity, its relationship to plate tectonics and its effect on society.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Learn the nature of volcanoes and their variety.
   b. Identify geographic regions with high rates of volcanic activity.
   c. Identify areas of high human population at risk from volcanic activity.
   d. Describe the methods used to predict volcanic eruptions.
   e. Identify the relationship between volcanoes, earthquakes, and plate tectonic boundaries.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   - in objective tests
   - through group presentations
   - in lab assignments
   - in written reports

   *Performance will be satisfactory when:*
   
   - learner explains how and why volcanoes occur
   - learner explains where volcanoes occur
   - learner describes the relationship between volcanoes and plate tectonic boundaries
   - learner explains the effects of volcanic activity on human history
5. **Interpret the different types of downslope movement, landslides, mass wasting, and their effect on human society.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Learn the different types and parts of landslides, downslope movement, and mass wasting.

b. Identify geographic regions with high risk of landslide activity.

c. Assess areas of high human population at risk from landslide activity.

d. Describe the methods and technologies used to predict and prevent landslides.

**Performance Standards**

*Competence will be demonstrated:*

- in objective tests
- through group presentations
- in lab assignments
- in written reports

*Performance will be satisfactory when:*

- learner explains how and why landslides occur
- learner explains where landslides occur
- learner explains the effects of landslides on human society
- learner explains methods developed to measure and predict landslides

6. **Examine the hazards associated with weather and climate.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Examine the physics of violent weather and climate change.

b. Identify geographic regions with high risk of violent weather.

c. Identify areas of high human population at risk from violent weather and/or climate change.

d. Describe the methods used to predict and measure violent weather and climate change.

**Performance Standards**

*Competence will be demonstrated:*

- in objective tests
- through group presentations
- in lab assignments
- in written reports

*Performance will be satisfactory when:*

- learner explains how and why violent weather and climate change occurs
- learner explains where violent weather occurs
- learner explains the effects of violent weather and climate change on human history
- learner describes methods used to measure and predict violent weather and climate change
7. **Examine the components of flooding, flood control, and flood prevention.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Examine the hydrology of rivers and streams and factors that control flooding.
b. Identify geographic regions with high risk of flooding.
c. Identify areas of high human population at risk from flooding.
d. Describe the methods used to predict flooding.
e. Identify the relationship between flooding, politics, and economics.
f. Examine the international history of attempts at flood control.

**Performance Standards**

*Competence will be demonstrated:*

- in objective tests
- through group presentations
- in lab assignments
- in written reports

*Performance will be satisfactory when:*

- learner explains how and why floods occur
- learner explains where floods occur
- learner describes the relationship between flooding, politics, and economics
- learner explains the effects of flooding and flood control on human history
- learner explains methods developed to measure and predict flooding

8. **Assess and identify the risks associated with the littoral environment.**

**Learning objectives**

*What you will learn as you master the competency:*

a. Learn the hazards of human occupation associated with the littoral environment.
b. Define the characteristics of wave action, tidal change, and eustatic sea level.
c. Identify the physics of erosion and deposition.
d. Describe the methods and technologies used to predict and prevent littoral hazards.
e. Identify the costs associated with public policy regarding littoral zones.

**Performance Standards**

*Competence will be demonstrated:*

- in objective tests
- through group presentations
- in lab assignments
- in written reports

*Performance will be satisfactory when:*

- learner explains how and why littoral hazards occur
- learner defines the characteristics of wave action, tidal change, and eustatic sea level
o learner describes the physics of erosion and deposition
o learner describes the methods and technologies used to predict and prevent littoral hazards
o learner explains the costs associated with public policy regarding littoral zones

9. **Assess and identify the risks associated with impact from meteorites, asteroids, and comets.**

**Learning objectives**
*What you will learn as you master the competency:*

a. Learn the different types of space-borne objects that are potential Earth impactors.
b. Learn the magnitude and frequency of impact hazards.
c. Describe the methods used to predict and/or prevent impact hazards.
d. Learn the history and effect of impact events on Earth’s history.

**Performance Standards**
*Competence will be demonstrated:*

o in objective tests
o through group presentations
o in lab assignments
o in written reports

*Performance will be satisfactory when:*

o learner explains what impact hazards are
o learner explains the magnitude and frequency of impacts
o learner describes the relationship between Earth’s orbit and potential impactors
o learner explains the effects of impact on Earth’s history
o learner explains methods developed to predict and prevent impact from space-borne objects

**Types of Instruction**
Lecture and class discussions
Lab experiments and demonstrations
Interactive computer software
Student presentations
Field trips

**Grading Information**

**Grading Rationale**
Exams and quizzes (3 Exams and 10 Quizzes) 50%
Lab exercises and field trips 30%
Final exam 20%
**Grading Scale**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>0-59%</td>
</tr>
</tbody>
</table>