

# EASTERN ARIZONA COLLEGE

## Historical Geology

Course Design  
2016-2017

**Course Information**

**Division** Science  
**Course Number** GLG 102  
**Title** Historical Geology  
**Credits** 4  
**Developed by** David Morris  
**Lecture/Lab Ratio** 3 Lecture/3 Lab

**Transfer Status**

ASU	NAU	UA
GLG 102 (3) & GLG 104 (1) , Natural Science - General (SG), Historical Awareness (H), Natural Science - General (SG)	GLG 104; Lab Science [LAB] -- and-- GLG 102; Science & Applied Science [SAS]	GEOS 255

**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** No  
**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 general education, lab science requirement for graduation and transfer, and is part of the required curriculum for many astronomy majors.

**Description**

This course is an introduction to the principles and interpretation of geologic history. It emphasizes the evolution of the earth's lithosphere (crust), atmosphere, and biosphere through geologic time. It includes consideration of the historical aspects of plate tectonics, the geologic development of North America, and important events in biological evolution and the resulting assembly of fossils. It provides an appreciation for the vast extent of geologic time, the natural processes affecting change on the earth, and the identification of common fossil types.

## **Supplies**

None

## **Competencies and Performance Standards**

- 1. Compare the contributions made in the past with the advanced methods used today in the field of geology.**

### **Learning objectives**

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

- Describe theories regarding the formation of the Earth.
- Explain the theory of plate tectonics.
- Define geology, its sub-disciplines, and career opportunities.
- Explain the importance of the study of geology to civilization.

### **Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- learner describes the history of geology
- learner describes modern scientific contribution to geology

- 2. Identify the most abundant and/or important minerals and rocks in the earth's crust and list their economic value.**

### **Learning objectives**

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

- Define a mineral.
- Identify the diagnostic physical properties of important minerals.
- Explain the basic structure of an atom and the formation of compounds.
- Explain the condition of formation of minerals.
- Identify and describe the properties of the eight basic rock-forming minerals.
- Describe the economic importance of major minerals.

### **Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- learner identifies the most important rocks and minerals found in the earth's crust
- learner explains the economic importance of the major minerals

**3. Explore the processes that form igneous, sedimentary, and metamorphic rocks and use the rock cycle to interrelate them.**

***Learning objectives***

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

- a. Explain the major processes of the rock cycle.
- b. Identify the texture and composition associated with each type of rock.
- c. Identify intrusive and extrusive igneous rocks.
- d. Identify metamorphic rocks resulting from various pressures, temperatures, and compositions.
- e. Identify landforms associated with the primary rock types.

***Performance Standards***

*You will demonstrate your competence:*

- o in objective tests
- o in lab reports

through group presentations

*Your performance will be successful when:*

- o learner explains the rock cycle
- o learner identifies the three major categories of rocks
- o learner identifies rocks from each major category
- o learner describes the conditions under which each type of rock formed
- o learner describes the composition of examples of each type of rock

**4. Explore the field and laboratory methods used to construct the geologic time scale and clearly distinguish between relative and absolute dating methods.**

***Learning objectives***

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

- a. Explain the principles of geology used to determine the ages of strata.
- b. Compare the difference between relative time and absolute time.
- c. Describe radiometric dating in determining the geologic ages.
- d. Explain the order of the geologic timescale and geologic columns based on Eons, Eras, Periods, and Epochs.

***Performance Standards***

*You will demonstrate your competence:*

- o in objective tests
- o in lab reports
- o through group presentations

*Your performance will be successful when:*

- o learner explains the methods used to determine the age of geologic materials
- o learner summarizes the geologic time scale based on theories regarding the formation of the Earth

**5. Interpret geologic structures based on surface outcrop patterns.**

***Learning objectives***

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

- a. Identify dip and strike patterns along outcrops in order to determine the geologic structures.
- b. Explain the three types of unconformities.
- c. Describe the types of faults, how they form, and their relationship to plate tectonic boundaries.
- d. Interpret geologic structures on geologic maps.
- e. Identify different physiographic provinces based on their geologic structures and rock types.

***Performance Standards***

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- learner identifies geologic structures from rock patterns on the surface of the Earth
- learner identifies geologic structures and plate tectonic boundaries associated with major physiographic provinces

**6. Interpret paleoenvironments based on sedimentary structures and fossils.**

***Learning objectives***

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

- a. Describe environmental factors that form various sediments.
- b. Identify rock material with specific types of environments.
- c. Interpret geologic maps.
- d. Interpret plate tectonic change based on observations of sedimentary rocks.

***Performance Standards***

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

- learner explains the environmental conditions that lead to distinct sedimentary strata
- learner correlates rock units in order to interpret the geologic past

**7. Identify past environment based on fossil assemblage.**

***Learning objectives***

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

- a. Explain the definition of a fossil.
- b. Describe the types of fossil preservation.

- c. Compare known fossils with the Linnaean System of Classification.
- d. Identify index fossils.
- e. Describe the evolution of various fossil types.
- f. Interpret a biostratigraphic map.

**Performance Standards**

*You will demonstrate your competence:*

- o in objective tests
- o in lab reports
- o through group presentations

*Your performance will be successful when:*

- o learner correlates specific fossil evidence with a specific environment
- o learner describes the changes in the past environment based on the changes in the fossil evidence

**8. Describe the major geologic events that occurred during the Precambrian, Paleozoic, Mesozoic, and Cenozoic eras.**

**Learning objectives**

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

- a. Explain the formation of the Earth's atmosphere, ocean, surface features and earliest life forms during Precambrian times.
- b. Compare the transgression and regression of seas during the geologic Eras.
- c. Identify erosional and depositional landform features that occurred during each of the geologic Eras.
- d. Compare the different life forms that evolved during each of the geologic Eras.
- e. Compare the different economic resources that developed during each of the geologic Eras.

**Performance Standards**

*You will demonstrate your competence:*

- o in objective tests
- o in lab reports
- o through group presentations

*Your performance will be successful when:*

- o learner explains geologic events associated with each geologic era
- o learner summarizes the evidence used to determine these events

**9. Explain how the knowledge regarding the Earth's interior layers influences the theory of plate tectonics.**

**Learning objectives**

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

- a. Identify the interior layers of the Earth.
- b. Explain the way in which different seismic waves respond to the different interior layers.
- c. Describe the properties of the major plate tectonic boundaries.
- d. Relate the effects of convection current activity in the mantle with plate tectonic

movement in the Earth's crust and hot-spot volcanism.

**Performance Standards**

*You will demonstrate your competence:*

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

*Your performance will be successful when:*

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

**Types of Instruction**

Lecture and class discussions

Lab experiments and demonstrations

Interactive computer software

Student presentations

Field trips

**Grading Information**

**Grading Rationale**

Exams (30)	50%
Lab Exercises (15)	20%
Field Trips (3)	10%
Final Exam	20%

**Grading Scale**

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Below 60%