

EASTERN ARIZONA COLLEGE

Physical Geology

Course Design
2016-2017

Course Information

Division Science
Course Number GLG 101 (SUN# 1101)
Title Physical Geology
Credits 4
Developed by David Morris
Lecture/Lab Ratio 3 Lecture/3 Lab

Transfer Status

ASU	NAU	UA
GLG 101 (3) & GLG 103 (1), Natural Science – Quantitative (SQ), Natural Science – Quantitative (SQ)	GLG 103; Lab Science [LAB] -- and-- GLG 101; Science & Applied Science [SAS]	GEOS 251

Activity Course No
CIP Code 40.0601
Assessment Mode Pre/Post Test (100 Questions/100 Points)
Semester Taught Fall
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 lab/science general studies requirement for graduation and is part of the required curriculum for geology majors. Geology imparts a uniquely broad perspective that incorporates science with history and development of civilization and culture.

Description

This course covers the fundamentals of geology: rocks, minerals, geologic time, plate tectonics, earthquakes, volcanoes, surface processes, and earth resources. The lab delves into the chemistry of minerals, how rocks form, geologic mapping with GPS, geology in the field, and other fundamental topics. Several field trips are taken each semester.

Supplies

None

Competencies and Performance Standards

- 1. Recognize the development of geological methods and theories used today in the field of modern geology and the contributions of geology to our understanding of the earth.**

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 and the different fields of study.
- Explain the importance of the study of geology.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- learner describes the history of geology and the development of plate tectonic theory
- learner describes the fundamental methods of modern 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 formation of minerals.
- Identify and describe the properties of the eight basic rock-forming minerals.
- Describe the economic importance of major minerals.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory 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

Competence will be demonstrated:

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

Performance will be satisfactory 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. Identify the tools and methods used to develop the modern geologic time scale.

Learning objectives

What you will learn as you master the competency:

- a. Explain Steno's Laws.
- b. Compare relative dating with radiometric dating.
- c. Describe the method of using naturally occurring unstable isotopes to determine the age of rocks and minerals.
- d. Classify the different units of time in the modern geologic timescale.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- o learner explains the methods used to determine the age of rock material
- o learner summarizes the geologic time scale, its components, and its development

5. Interpret geologic structures based on outcrops and geomorphology.

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. Identify the three types of unconformities.
- c. Describe the types of faults and how and where they form in relation to plate tectonics.
- d. Interpret geologic structures on geologic maps and create cross-sections.
- e. Identify different physiographic provinces based on their geologic structures and rock types.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

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

6. Examine the effects of mass wasting.

Learning objectives

What you will learn as you master the competency:

- a. Describe factors that influence mass movement.
- b. Identify the characteristics of different types of mass movement.
- c. Identify the hazards associated with mass wasting.
- d. Describe the remediation techniques for different types of mass wasting.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- learner explains the processes that cause mass wasting
- learner describes the effects mass wasting has on the Earth

7. Examine the components of hydrology and geo-hydrology, and their impact on society.

Learning objectives

What you will learn as you master the competency:

- a. Explain factors that control groundwater movement.
- b. Describe the water table and zones of aeration and saturation.
- c. Identify artesian wells, aquifers, spring and geysers.

- d. Distinguish between fluvial competency and fluvial capacity.
- e. Explain entrainment and saltation.
- f. Distinguish between suspended load, bed load, and dissolved load.
- g. Explain how river channels evolve and drainage patterns develop.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- o learner explains the stages of groundwater and river development
- o learner describes the effects of groundwater and rivers on society

8. Identify the major properties and effects of alpine and continental glaciers.

Learning objectives

What you will learn as you master the competency:

- a. Explain the term glacier.
- b. Describe the differences between alpine and continental glaciers.
- c. Identify erosional and depositional landform features of glaciers.
- d. Explain climate theories and the Milankovitch cycle regarding ice ages.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- o learner explains the formation of different types of glaciers
- o learner identifies the evidence left by past episodes of glaciation
- o learner summarizes the erosional and depositional landforms associated with each type of glacier

9. Examine the ways in which earthquakes are located, measured, and predicted.

Learning objectives

What you will learn as you master the competency:

- a. Explain the properties of P-wave, S-wave and surface seismic waves.
- b. Identify areas in the world with intense earthquake activity.
- c. Describe the effects of an earthquake.
- d. Describe the methods used to predict earthquakes.
- e. Identify the relationship between earthquakes and plate tectonic boundaries.

Performance Standards

Competence will be demonstrated:

- o in objective tests

- o in lab reports
- o through group presentations

Performance will be satisfactory when:

- o learner explains how earthquakes occur
- o learner explains where earthquakes occur
- o learner describes the relationship between earthquakes and plate tectonic boundaries
- o learner explains the effects of earthquake activity
- o learner explains methods developed to predict earthquakes

10. 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 physical and chemical layers of the Earth and their boundary properties.
- 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 cells in the mantle with plate tectonic movement of the Earth's crust.

Performance Standards

Competence will be demonstrated:

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

Performance will be satisfactory when:

- o learner describes the properties associated with each of the Earth's interior layers
- o learner explains methods used by geologists to identify these various interior layers
- o 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 (3)	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%