

GEOS General Education Core Assessment Plan

WHAT UNIVERSITY GENERAL EDUCATION OUTCOMES GUIDE STUDENT LEARNING IN COURSES THAT CARRY NATURAL SCIENCES CREDIT?

A primary goal of these courses is to develop an appreciation of the basic principles that govern natural phenomena and the role of experiment and observation in revealing these principles. Students should acquire an understanding of the relationship between hypothesis, experiment, and theory, and develop the skills common to scientific inquiry, including the ability to frame hypotheses and defend conclusions based on the analysis of data. These courses are designed to prepare a student for informed citizenship by illustrating the importance of science and technology to the present and future quality of life and the ethical questions raised by scientific and technological advances.

Upon completion of eight hours of science courses, students will:

- NSLO1a - Understand how scientific inquiry is performed.
- NSLO2a - Understand the boundaries of scientific data.
- NSLO3a - Have a basic working knowledge of a few areas of science.
- NSLO4a - Be able to make better-informed decisions regarding potential government policies that involve science.
- NSLO5a - Have improved problem solving skills.
- NSLO6a - Be able to identify challenges created by society's increasing reliance upon technology.

HOW DOES THE DEPARTMENT OF GEOLOGICAL SCIENCES INTEND TO ASSESS STUDENT LEARNING OF THESE OUTCOMES IN GEOL 1113/1111L?

The assessment consists of a pre-test in each course at the start of the semester followed by a post-test near the end of the semester. Assessment exams included 20 questions composed and agreed upon by the faculty teaching GEOS 1113. The questions for each exam were designed to be overarching and related to broad thematic components of each of the courses. Analysis of student performance will be based on overall performance on the exam, not on the individual questions. The same assessment exam will be used for multiple semesters so that performance over time can be compared.

HOW IS THE ASSESSMENT INSTRUMENT KEYED TO THE UNIVERSITY GENERAL EDUCATION CORE CURRICULUM LEARNING OUTCOMES FOR THE NATURAL SCIENCES?

1. The three major classes of rock are known as:

- | | |
|--|--|
| a. crustal, subcrustal, and transitional | b. sedimentary, igneous, and metamorphic |
| c. volcanic, plutonic, and transitional | d. weathered, eroded, and cemented |

- e. big rocks, small rocks, and ugly rocks

NSLO2a; NSLO3a

2. The most dominant rock associated with our continents is known as:

- a. basalt
- b. granite
- c. limestone
- d. marble
- e. rhyolite

NSLO1a; NSLO3a; NSO5a

3. What are the three types of sedimentary rocks?

- a. detrital, chemical, organic
- b. foliated, nonfoliated, contact
- c. intrusive, extrusive, felsic
- d. obsidian, basalt, andesite
- e. detrital, organic, porphyritic

NSLO1a; NSLO2a; NSLO3a

4. The most common end product of the chemical weathering of feldspar is:

- a. quartz
- b. hornblende
- c. clay
- d. pyroxene
- e. calcite

NSLO1a; NSL03a; NSL05a

5. The Earth's internal heat engine causes hot rocks in the mantle to _____, whereas colder rocks tend to _____.

- a. contract and rise; expand and sink
- b. expand and rise; contract and sink
- c. expand and sink; contract and rise
- d. move laterally; stay stationary
- e. none of the above

NSLO1a; NSLO3a; NSLO5a

6. A _____ is a scientific concept that has been highly tested and is in all likelihood true.

- a. concept
- b. hypothesis
- c. theory
- d. scenario
- e. belief

NSL01a; NSL02a; NSO4a; NSO5a;

7. In order for an aquifer to meet the demands of heavy domestic, industrial, and agricultural water use, it must have:

- a. high porosity
- b. high permeability
- c. low porosity
- d. low permeability
- e. (a) and (b)

NSLO1a; NSLO3a; NSLO4a; NSLO6a

8. Fossil evidence indicates that complex life forms developed approximately _____ years before present

- a. 5, 440
- b. 544 thousand
- c. 544 million
- d. 3.5 billion
- e. none of the above

NSLO1a; NSLO2a; NSLO3a

9. Which of the following elements is not abundant in the Earth's crust:

- a. oxygen
- b. uranium
- c. silicon
- d. calcium
- e. aluminum

NSLO2a; NSLO3a

10. The Earth's lithosphere is comprised of the:

- a. crust
- b. asthenosphere
- c. core
- d. uppermost mantle
- e. (a) and (d)

NSLO1a; NSLO2a; NSLO3a

11. Earth is unique among terrestrial planets in that it:

- a. has liquid water at its surface
- b. has an atmosphere rich in nitrogen and oxygen
- c. has an active system of (plate) tectonics
- d. supports a biosphere

e. all of these are unique attributes of Earth

NSLO1a; NSLO2a; NSLO3a

12. A Benioff earthquake zone is significant in plate tectonics theory because it:

- a. locates rift valleys on continents
- b. coincides with mid-oceanic ridges
- c. traces the descent of subducting sea-floor lithospheric slabs
- d. locates major strike-slip faults
- e. indicates the location of magma chambers

NSLO1a; NSLO2a; NSLO3a; NSLO6a; NSLO4a; NSLO5a

13. The majority of time in Earth history is associated with the:

- a. Cenozoic Era
- b. Paleozoic Era
- c. Mesozoic Era
- d. Precambrian
- e. Phanerozoic Eon

NSLO1a; NSLO2a; NSLO3a; NSLO5a

14. When a marine geologist collects a core of undeformed ocean-floor sediment, she knows that the youngest layer is on the top of the core and the oldest is at the bottom because of the principle of _____.

- a. supposition
- b. suspension
- c. superposition
- d. inclusion
- e. cross-cutting relationships

NSLO1a; NSLO2a; NSLO5a

15. Slightly acidic ground water can dissolve limestone as it flows along joints and bedding planes to form caves. This reaction may then be reversed as water drips from the ceiling and splashes on the floor of an air-filled cave and minerals are precipitated to form features known as:

- a. stalactites
- b. stalagmites
- c. sinkholes
- d. (a) and (b)
- e. all of the above

NSLO1a; NSLO2a; NSLO3a

16. The erosional removal of mass from mountainous regions underlain by thick crustal roots or the removal of weight through melting of continental scale ice sheets can result in uplift of the

lithosphere. Such vertical movements to achieve gravitational equilibrium between adjacent parts of the Earth's lithosphere are known as:

- a. plate tectonics
- b. magnetic anomalies
- c. isostatic adjustments
- d. compressional stresses
- e. none of the above

NSLO1a; NSLO2a; NSLO3a; NSLO5a

17. The inference that the Earth's outer core is liquid comes from

- a. density calculations
- b. studies of meteorites
- c. P-wave shadow zones
- d. S-wave shadow zones
- e. the outer core isn't liquid

NSLO1a; NSLO2a; NSLO3a; NSLO4; NSLO5a; NSLO6a;

18. The principal mineral forming limestone is

- a. quartz
- b. gypsum
- c. halite
- d. calcite
- e. hematite

NSLO1a; NSLO2a; NSLO3a

19. Eruptions of shield volcanoes fed by mafic magma tend _____.

- a. to be violent and potentially dangerous events
- b. to be explosive but short-lived
- c. not to be explosive or particularly dangerous
- d. to result in the expulsion of vast amounts of tephra
- e. to cover the surrounding landscape in ash

NSLO1a; NSLO2a; NSLO3a; NSLO4a; NSLO5a; NSLO6a

20. Reverse faults are examples of _____ that result from _____ stresses.

- a. dip-slip faults, tensional
- b. dip-slip faults, compressional
- c. strike-slip faults, tensional
- d. strike-slip faults, compressional
- e. transform faults

NSLO1a; NSLO2a; NSLO3a; NSLO4a; NSLO5a; NSLO6a

HOW WILL THE DEPARTMENT OF GEOLOGICAL SCIENCES USE THE DATA GENERATED BY THIS INSTRUMENT TO PLAN CURRICULAR AND PEDAGOGICAL CHANGES THAT MIGHT BE NECESSARY IN GEOL 1113/1111L?

Analysis of student performance was based on overall performance on the exam, not on the individual questions. Faculty review the exam results annually, including responses on individual questions and will modify some questions for the assessment to better respond to the Natural Science Learning Outcomes. The faculty will discuss the results of the assessment process to identify problem areas in the course that can be addressed through implemented curricular modification including changes to course content or structure, and delivery mechanisms necessary to meet the needs of the target audience and fully address the Natural Science Learning Outcomes.