

Course Description

GLY1010 | Physical Geology | 3.00 credits

Using the scientific method, critical thinking skills and data analysis, this course will examine the fundamental processes of the earth system, composed of an atmosphere, hydrosphere, cryosphere, lithosphere, biosphere, and exosphere through time. The course will also explore interactions between these spheres, including critical analysis of scientific theories and emphasize lithospheric connections with humanity. Student learning outcomes: students will use critical thinking to recognize the rigorous standards of scientific theories; students will analyze and synthesize geoscience data to draw scientifically valid conclusions; students will recognize the different time scales associated with different geologic processes; students will describe interactions between humans and earth's spheres; and students will apply their understanding of geologic principles to complex issues.

Course Competencies:

Competency 1: The student will demonstrate knowledge of introductory chemistry and Earth materials by:

1. Defining atom, element, isotope, ion, compound, mineral, and rock
2. Explaining basic atomic structure and chemical bonding
3. Defining and identifying the physical properties of minerals
4. Distinguishing between silicate and non-silicate minerals
5. Defining and distinguishing between igneous, sedimentary, and metamorphic rocks
6. Understanding and explaining the rock

Competency 2: The student will demonstrate knowledge of the Continental Drift Theory, Plate Tectonics, related internal geological processes, and associated landforms by:

1. Discussing the dynamic interaction between Earth's lithosphere and asthenosphere
2. Comparing and contrasting three types of plate boundaries and the motion occurring at each type
3. Analyzing the geological processes occurring at each type of plate boundary
4. Explaining the surface landforms resulting from geological processes at each type of boundary

Competency 3: The student will demonstrate knowledge of seismic activity and the geological hazards it poses to human populations by:

1. Defining related vocabulary including earthquake, fault, seismic energy, focus, epicenter, magnitude, intensity, and seismology
2. Comparing the types of seismic energy waves and ground motion associated with each aspect
3. Locating and describing major earthquake belts of the Earth and U.S. areas of widely recognized risk
4. Evaluating earthquake related hazards and methods for their reduction: ground shaking, fire, tsunamis, and structural damage
5. Discussing earthquake prediction and forecasting
6. Analyzing and discussing proposed methods of reduced structural damage before, during and after an earthquake
7. Discussing earthquake awareness and concerns related to predictions and urban planning

Competency 4: The student will demonstrate knowledge of volcanic activity and the hazards it poses to human populations and the environment by:

1. Defining related vocabulary including volcano, magma, lava, geyser, hot spring, fumarole, laccolith, batholith, and pluton
2. Comparing the types of locations of volcanic activity, including mid-ocean ridges, fissures, vent eruptions, and hot spots
3. Classifying volcanoes by structure and activity such as explosiveness and magma/lava viscosity
4. Describing and analyzing the primary and secondary effects of volcanic hazards
5. Discussing issues in predicting volcanic eruptions

6. Analyzing past, present, and future volcanic eruptions and hazards in order to establish patterns, and urban population procedures

Competency 5: The student will demonstrate knowledge of Earth's surface processes and hazards they pose by:

1. Defining terminology used for surface processes such as stream, stream channel, drainage basin, tributary, distributivity, floodplain, stream discharge, stream velocity, stream gradient, base level, and sediment transport
2. Defining the Hydrological Cycle
3. Comparing the three types of sediment transport and sorting by streams: bedload, suspended load, and dissolved load
4. Describing floodplain evolution and distinguishing the differences between a rising flood, and a flash flood
5. Discussing the consequences of development in floodplains and the effects of flood hazards on human populations
6. Analyzing natural and hard stabilization efforts in reducing flood hazards
7. Recognizing coastal hazards
8. Distinguishing between emergent and subsegment shorelines
9. Describing coastal erosion and coastal sediment transport and deposition
10. Analyzing coastal dynamics and hazards relative to sea level fluctuations, storms, and coastal erosion
11. Defining the types of mass movements: fall, slide, slump, flows, and avalanches
12. Listing and describing the factors affecting slope stability: gravity, water, vegetation, and earthquakes
13. Listing and describing the types of glaciers
14. Describing glacial formation and movement
15. Describing glacial erosion and deposition and classifying associated features
16. Discussing past climates and environments related to ice ages and possible causes
17. Evaluating natural deserts and their relationship with atmospheric currents (wind)
18. Distinguishing between deserts relative to the quantity of sand, vegetation, and wind direction

Competency 6: The student will analyze and identify Earth's natural resources by:

1. Distinguishing between surface water and groundwater resources
2. Comparing confined and unconfined aquifers
3. Evaluating consequences of groundwater withdrawal
4. Identifying landform features associated with subsurface water
5. Discussing weathering and soil formations
6. Defining a soil profile and the soil horizons
7. Defining ore deposits and classifying types of mineral deposits
8. Describing the formation of oil and natural gas deposits
9. Describing and discussing Hydraulic Fracturing and Acid Fracturing

Competency 7: The student will demonstrate knowledge of geological history by:

1. Determining a time sequence of geological events and distinguishing between numerical and relative dating
2. Defining the term fossil and describing the various types and the conditions that favor the preservation of organisms
3. Explaining how the ways fossils and rocks are used in the correlation of rock layers
4. Discussing how unstable isotopes are used to determine numerical dates
5. Explaining how numerical dates are determined for sedimentary rocks
6. Distinguishing between the units of the geological time scale

General Education Learning Outcomes:

- Solve problems using critical and creative thinking and scientific reasoning
- Describe how natural systems function and recognize the impact of humans on the environment