Miami Dade College

Course Description

GLY1010L | Physical Geology Laboratory | 1.00 credit

Laboratory for GLY1010. Studies of common minerals and rocks and topographic and geologic maps along with aerial photography. Corequisite: GLY1010

Course Competencies:

Competency 1: The student will demonstrate knowledge of the basics of mineral and rock identification:

1. Defining a mineral and knowing the difference between a mineral and a rock
2. Measuring the physical properties of minerals such as color, luster, hardness, streak, cleavage, fracture, habit/shape, HCL reaction, magnetism, taste, and feel
3. Using the physical properties to group and distinguish common minerals
4. Identifying minerals with mineral charts
5. Identifying minerals typical in igneous, sedimentary, and metamorphic rocks
6. Identifying textures in ingenious, sedimentary, and metamorphic rocks
7. Identifying rocks using rock classification charts: igneous, sedimentary (detrital, chemical, biochemical), and metamorphic (foliated and non-foliated)
8. Relating mineral size to cooling rates and general origin

Competency 2: The student will demonstrate knowledge of Plate Tectonics and 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
5. Correlating a magnetic profile along a divergent boundary
6. Determining the spreading rates and ages of the North and South Atlantic basins

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. Identifying P, S, and surface waves on a simple seismogram
4. Locating the epicenter of an earthquake using seismograms and travel-time curves
5. 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/ lave 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 to establish patterns and urban population procedures

Competency 5: The student will demonstrate knowledge of Earth's surface processes (Water as a Source, Glaciers, and Coastal Landforms) and hazards they pose by:

1. Defining terminology used for surface processes such as stream, stream channel, drainage basin, tributary, distributary, floodplain, stream discharge, stream velocity, stream gradient, base level, and sediment transport
2. Identifying the types of drainage patterns and infer their underlying geological controls
3. Comparing the three types of sediment transport and sorting by streams: bedload, suspended load, and dissolved load
4. Describing floodplain evolution and distinguish the differences between rising and flash floods
5. Discussing the consequences of floodplain development and the effects of flood hazards on human populations
6. Analyzing natural and strenuous stabilization efforts in reducing flood hazards
7. Recognizing coastal hazards
8. Distinguish between emergent and submerged 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 relative to the 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
19. Distinguishing between surface water and groundwater resources
20. Comparing confined and unconfined aquifers
21. Evaluating consequences of groundwater withdrawal
22. Identifying landform features associated with subsurface water

Competency 6: The student will analyze and identify geologic structures and geological maps by:

1. Measuring strike and dip Plot strike and dip on a map
2. Determining the general orientation of strike and dip on the surface of a block diagram
3. Recognizing structural geology symbols used on maps: strike, dip, folds, faults
4. Defining, sketching, and recognizing a dome or basin, and a plunging and non-plunging anticline and syncline on a block diagram
5. Defining, sketching, and recognizing a normal, reverse, and strike-slip fault on a cross-section or a block diagram
6. Distinguishing the hanging wall and footwall of a normal, reverse, and thrust fault on a cross-section or block diagram
7. Completing the block diagram with the correct strike, dip, and stratigraphic units

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

1. Identifying a time sequence of geological events and distinguishing between numerical and relative dating
2. Defining the term fossil and describe the various types and the conditions that favor the preservation of organisms
3. Explaining how fossils and rocks are used to correlate rock layers
4. Recognizing unconformities and understand what they represent
5. Explaining how numerical dates are determined for sedimentary rocks
6. Distinguishing between the units of the geological time scale
7. Understanding the basic concepts of radiometric age determination

Competency 8: The student will demonstrate basic knowledge of mapping by:

1. Designing contour lines and understand their characteristics
2. Identifying contour intervals and index contours
3. Determining surface elevations, height, and relief
4. Measuring land slopes and directions
5. Determining stream flow direction and gradient
6. Contouring a topographic map using elevation data
7. Interpreting cross-sectional profiles of land surfaces and determining vertical exaggeration
8. Using contour lines to read a topographic map and visualize the Earth's surface features
9. Recognizing the geometric shape of the land surface
10. Identifying topographic features
11. Read map symbols and identify features such as roads, rivers, vegetation, etc.
12. Identifying and understanding the differences between Townships and Ranges and Congressional Townships of the Public Land Survey System

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information