

# Course Competency

## GLY 1010L Physical Geology Laboratory

### Course Description

Laboratory for GLY1010. Laboratory fee. (2 hr. lab) Selected concepts and principles of geology studied are: minerals, rocks (igneous, sedimentary, and metamorphic), plate tectonics, earthquakes and seismic waves, volcanoes (shield, cinder, and composite), rock structures and cross-sections, dynamics of running water and groundwater, formation of glaciers and glacial landforms, interpretation of topographic maps and the Public Land Survey System, concepts of oceanography and shoreline processes, and geological time.

Course Competency	Learning Outcomes
<p><b>Competency 1:</b> The student will demonstrate knowledge of basics of mineral and rock identification:</p>	<ol style="list-style-type: none"> <li>1. Numbers / Data</li> <li>2. Critical thinking</li> <li>3. Information Literacy</li> <li>4. Computer / Technology Usage</li> <li>5. Aesthetic / Creative Activities</li> </ol>
<ol style="list-style-type: none"> <li>a. Defining a mineral and knowing the difference between a mineral and a rock.</li> <li>b. Measuring the physical properties of minerals such as: color, luster, hardness, streak, cleavage, fracture, habit/shape, HCL reaction, magnetism, taste, and feel.</li> <li>c. Using the physical properties to group and distinguish common minerals.</li> <li>d. Identify minerals with mineral charts.</li> <li>e. Identify minerals that are typical in igneous, sedimentary, and metamorphic rocks.</li> <li>f. Identify textures that are in igneous, sedimentary, and metamorphic rocks.</li> <li>g. Identify rocks using rock classification charts: igneous, sedimentary (detrital, chemical, biochemical), and metamorphic (foliated and non-foliated).</li> <li>h. Relate mineral size to cooling rates and general origin.</li> </ol>	

<p><b>Competency 2:</b>The student will demonstrate knowledge of Plate Tectonics and related internal geological processes, and associated landforms by:</p>	<ol style="list-style-type: none"> <li>1. Communication</li> <li>2. Numbers / Data</li> <li>3. Critical thinking</li> <li>4. Information Literacy</li> <li>5. Aesthetic / Creative Activities</li> </ol>
<ol style="list-style-type: none"> <li>a. Discussing the dynamic interaction between Earth’s lithosphere and asthenosphere.</li> <li>b. Comparing and contrasting three types of plate boundaries and the motion occurring at each type.</li> <li>c. Analyzing the geological processes occurring at each type of plate boundary.</li> <li>d. Explain the surface landforms resulting from geological processes at each type of boundary.</li> <li>e. Correlate a magnetic profile along a divergent boundary.</li> <li>f. Determine the spreading rates and ages of the North and South Atlantic basins.</li> </ol>	
<p><b>Competency 3:</b>The student will demonstrate knowledge of seismic activity and the geological hazards it poses to human populations by:</p>	<ol style="list-style-type: none"> <li>1. Numbers / Data</li> <li>2. Critical thinking</li> <li>3. Information Literacy</li> <li>4. Computer / Technology Usage</li> </ol>
<ol style="list-style-type: none"> <li>a. Defining related vocabulary including earthquake, fault, seismic energy, focus, epicenter, magnitude, intensity, and seismology.</li> <li>b. Comparing the types of seismic energy waves and ground motion associated with each aspect.</li> <li>c. Identify P, S, and surface waves on a simple seismogram.</li> <li>d. Locate the epicenter of an earthquake using seismograms and travel-time curves.</li> <li>e. Discussing earthquake awareness and concerns related to predictions and urban planning.</li> </ol>	
<p><b>Competency 4:</b>The student will demonstrate knowledge of volcanic activity and the hazards it poses to human populations and the environment by:</p>	<ol style="list-style-type: none"> <li>1. Numbers / Data</li> <li>2. Critical thinking</li> <li>3. Information Literacy</li> <li>4. Computer / Technology Usage</li> </ol>

<ul style="list-style-type: none"> <li>a. Defining related vocabulary including volcano, magma, lava, geyser, hot spring, fumarole, laccolith, batholith, and pluton.</li> <li>b. Comparing the types of locations of volcanic activity including mid-ocean ridges, fissures, vent eruptions, and hot spots.</li> <li>c. Classifying volcanoes by structure and activity such as explosiveness and magma/lave viscosity.</li> <li>d. Describing and analyzing the primary and secondary effects of volcanic hazards.</li> <li>e. Discussing issues in predicting volcanic eruptions.</li> <li>f. Analyzing past, present, and future volcanic eruptions and hazards in order to establish patterns, and urban population procedures.</li> </ul>	
<p><b>Competency 5:</b> The student will demonstrate knowledge of Earth’s surface processes (Water as a Source, Glaciers, and Coastal Landforms) and hazards they pose by:</p>	<ul style="list-style-type: none"> <li>1. Communication</li> <li>2. Critical thinking</li> <li>3. Information Literacy</li> <li>4. Numbers / Data</li> <li>5. Cultural / Global Perspective</li> <li>6. Environmental Responsibility</li> <li>7. Computer / Technology Usage</li> </ul>
<ul style="list-style-type: none"> <li>a. 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. b. Identify the types of drainage patterns and infer their underlying geological controls.</li> <li>b. Comparing the three types of sediment transport and sorting by streams: bedload, suspended load, and dissolved load.</li> <li>c. Describing floodplain evolution and distinguishing the differences between a rising flood, and a flash flood.</li> <li>d. Discussing the consequences of development in floodplains and the effects of flood hazards on human populations.</li> <li>e. Analyzing natural and hard stabilization efforts in reducing flood hazards.</li> </ul>	

<ul style="list-style-type: none"> <li>f. Recognizing coastal hazards.</li> <li>g. Distinguish between emergent and submergent shorelines.</li> <li>h. Describing coastal erosion and coastal sediment transport and deposition.</li> <li>i. Analyzing coastal dynamics and hazards relative to sea level fluctuations, storms and coastal erosion.</li> <li>j. Defining the types of mass movements: fall, slide, slump, flows, and avalanches.</li> <li>k. Listing and describing the factors affecting slope stability: gravity, water, vegetation, and earthquakes.</li> <li>l. Listing and describing the types of glaciers.</li> <li>m. Describing glacial formation and movement.</li> <li>n. Describing glacial erosion and deposition and classifying associated features.</li> <li>o. Discussing past climates and environments relative to Ice Ages and possible causes.</li> <li>p. Evaluating natural deserts and the relationship with atmospheric currents (wind).</li> <li>q. Distinguish between different deserts relative to quantity of sand, vegetation, and wind direction.</li> <li>r. Distinguishing between surface water and groundwater resources.</li> <li>s. Comparing confined and unconfined aquifers.</li> <li>t. Evaluating consequences of groundwater withdrawal.</li> <li>u. Identifying landform features associated with subsurface water.</li> </ul>	
<p><b>Competency 6:</b> The student will analyze and identify geologic structures and geological maps.</p>	<ol style="list-style-type: none"> <li>1. Numbers / Data</li> <li>2. Critical thinking</li> <li>3. Information Literacy</li> <li>4. Aesthetic / Creative Activities</li> <li>5. Computer / Technology Usage</li> </ol>
<ul style="list-style-type: none"> <li>a. Measure strike and dip.</li> <li>b. Plot strike and dip on a map.</li> <li>c. Determine the general orientation of strike and dip on surface of block diagram.</li> <li>d. Recognize structural geology symbols used on maps: strike, dip, folds, faults.</li> <li>e. Define, sketch, and recognize a dome or basin, and a plunging and non-plunging anticline and syncline on a block diagram.</li> </ul>	

<p>f. Define, sketch, and recognize a normal, reverse, and strike slip fault on a cross section or a block diagram.</p> <p>g. Distinguish the hanging wall and footwall of a normal, reverse, and thrust fault on a cross section or block diagram.</p> <p>h. Complete block diagram with correct strike, dip, and stratigraphic units.</p>	
<p><b>Competency 7:</b>The student will demonstrate knowledge of geological history by:</p>	<ol style="list-style-type: none"> <li>1. Communication</li> <li>2. Numbers / Data</li> <li>3. Critical thinking</li> <li>4. Information Literacy</li> <li>5. Aesthetic / Creative Activities</li> <li>6. Computer / Technology Usage</li> </ol>
<ol style="list-style-type: none"> <li>a. Determine a time sequence of geological events and distinguish between numerical and relative dating.</li> <li>b. Define the term fossil and describe the various types and the conditions that favor the preservation of organisms.</li> <li>c. Explain the ways fossils and rocks are used in the correlation of rock layers.</li> <li>d. Recognize unconformities and understand what they represent.</li> <li>e. Explain how numerical dates are determined for sedimentary rocks.</li> <li>f. Distinguish between the units of the geological time scale.</li> <li>g. Understand the basic concepts of radiometric age determination.</li> </ol>	
<p><b>Competency 8:</b>The student will demonstrate basic knowledge of mapping by:</p>	<ol style="list-style-type: none"> <li>1. Communication</li> <li>2. Numbers / Data</li> <li>3. Critical thinking</li> <li>4. Information Literacy</li> <li>5. Computer / Technology Usage</li> </ol>
<ol style="list-style-type: none"> <li>a. Designing contour lines and understand their characteristics.</li> <li>b. Identifying contour intervals and index contours</li> </ol>	

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| <ul style="list-style-type: none"><li>c. Determining surface elevations, height, and relief</li><li>d. Measuring land slopes and directions</li><li>e. Determining stream flow direction and gradient</li><li>f. Contouring a topographic map using elevation data.</li><li>g. Interpreting cross sectional profiles of land surfaces and determine vertical exaggeration.</li><li>h. Using contour lines to read a topographic map and visualize the Earth's surface features.</li><li>i. Recognizing geometric shape of land surface</li><li>j. Identifying topographic features</li><li>k. Read map symbols and identify features such as roads, rivers, vegetation, etc.</li><li>l. Identifying and understand the differences between Townships and Ranges and Congressional Townships of the Public Land Survey System.</li></ul> |  |
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