Miami Dade College

Course Description

ESC1000 | General Education Earth Science | 3.00 credits

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

Course Competencies:

Competency 1: The student will show knowledge, comprehension, and application of the historical development of the geological sciences by:

1. Identifying and defining terms and people related to the development of the geological sciences, including but not limited to Greek and Roman philosophers/ scientists, catastrophists, the role of the church in Western Europe, and recent developments in the development of the geological sciences.
2. Identifying and/or defining the major principles and laws that form the foundations of geology, including but not limited to correlation, faunal succession, cross-cutting relationships, original horizontality, superposition, and uniformitarianism.
3. Discussing the relationship between the work that geologists do and our daily lives.
4. Defining various terms used in dating the earth, including relative age dating, absolute age dating, radioactive decay, half-life, atomic number, atomic mass, alpha particle, beta particle, and isotope.
5. Explaining how radioactive age dating techniques are used to determine the age of the earth.
6. Explaining the limitations of different radioactive dating techniques.
7. Reproducing the geologic time scale using both geologic terms and absolute dates.

Competency 2: The student will show knowledge, comprehension, and application of using techniques that you have learned in determining a possible sequence of events that could explain how a selected geologic sequence of strata formed by:

1. Explaining what discontinuities are and how they form.
2. Developing a logical sequence of events that could result in the geologic cross-section that you are given.

Competency 3: The student will show knowledge, comprehension, and application of the different types of minerals as well as the rock cycle and the three major types of rocks by:

1. Defining a mineral.
2. Explaining how minerals are identified.
3. Defining terms used in identifying minerals and specific examples of minerals utilizing these properties, including but not limited to luster, hardness, streak, crystal form, cleavage, fracture, Moth's hardness scale, taste, and color.
4. Using common everyday items, determine a range of hardness for an unknown mineral.
5. Comparing and contrasting the seven different mineral groups.
6. Explaining the rock cycle.
7. Describing the relationship between texture and the cooling rate related to igneous rocks.
8. Describing how igneous rocks are classified.
9. Describing how sedimentary rocks are classified.
10. Describing how metamorphic rocks are classified

11. Comparing and contrasting clastic and nonelastic sedimentary rocks.
12. Comparing and contrasting the different types of nonelastic sedimentary rocks.
13. Defining various terms related to the three types of rocks including, but not limited to metamorphism, igneous texture, evaporite basin, precipitate, mafic, felsic, silicic, intrusive, extrusive, foliated, phyllite, schist, gneiss, porphyritic, contact metamorphism, glassy, oolite, regional metamorphism, organic, salt dome, aphanitic, and catacaustic metamorphism
14. Describing the steps involved in the formation of coal.

Competency 4: The student will show knowledge, comprehension, and application of how and why earthquakes occur by:

1. Describing the geographic distribution of earthquakes.
2. Defining various terms related to earthquakes, including but not limited to stress, strain, rupture, elastic limit, the zone of plastic flow, the zone of elastic flow, focus, Richter Scale, Modified Mercalli Scale, and epicenter.
3. Comparing and contrasting the Modified Mercalli Scale and the Richter Scale.
4. Describing how the velocity of different types of seismic waves vary as they travel through the earth.
5. Describing how to determine the focus of an earthquake using the data obtained from seismograms.
6. Describing what causes deaths when earthquakes occur.
7. Describing various ways that scientists are trying to predict earthquakes.
8. Explaining a possible way to control earthquakes.
9. Describing how buildings might be designed to minimize the effects of earthquakes

Competency 5: The student will show knowledge, comprehension, and application of the concept of plate tectonics by:

1. Describing the historical development of the concept of plate tectonics.
2. Describing the various types of plate boundaries
3. Comparing and contrasting different lines of evidence used to prove that plate tectonics occurs.
4. Defining various terms related to plate tectonics, including but not limited to: mid-ocean ridge, central rift valley, tensional forces, convection cell, paleomagnetism, Curie Point, remnant magnetism, magnetic reversal, divergent plate boundaries, convergent plate boundaries, transform fault, hot spot, Ring of Fire, subduction zone, Benioff Zone, and volcanic island arc.

Competency 6: The student will show knowledge, comprehension, and application of volcanic action and igneous intrusions by:

1. Comparing and contrasting the different types of volcanoes.
2. Defining the following terms related to igneous features, including but not limited to volcanism, viscosity, shield volcano, stratovolcano, cinder cone volcano, composite volcano, nuée ardente, lahar, tiltmeter, harmonic seismic waves, laccolith, batholith, stock, and pyroclastic flows.
3. Discussing how geologists try to predict volcanic eruptions.
4. Comparing and contrasting concordant and discordant igneous intrusions

Competency 7: The student will show knowledge, comprehension, and application of the surface flow of water and groundwater by:

1. Discussing the changes that occur in a stream as one travels from its' headwaters to its mouth.
2. Defining the following terms related to running water and groundwater, including but not limited to: zone of aeration, zone of saturation, water table, artesian water system, spring, well, velocity, competence, capacity, discharge, stream, river, stalactite, stalagmite, column, and karst topography
3. Discussing the stages of stream and valley development.
4. Discussing the flow of groundwater and the relationship between the water table and the surface topography.

5. Discussing the chemical reactions that occur when groundwater travels through limestone.
6. Discussing the geological effects of groundwater.

Competency 8: The student will show knowledge, comprehension, and application of the basic principles of oceanography by:

1. Discussing the structure and bathymetry of the continental margins as well as the deep ocean basins.
2. Comparing and contrasting the types of sediments found on the seafloor.
3. Discussing the origin of submarine canyons and atolls.
4. Discussing tides.
5. Discussing how wave action modifies coastlines.
6. Discussing, using specific examples, the movement of sand along a beach and the effects of man's intervention.
7. Defining the following terms related to oceanography, including but not limited to: turbidity flow, abyssal plains, deep ocean trench, terrigenous sediment, biogenous sediment, hydrogenous sediment, wave height, wavelength, wave refraction, longshore current, spit, bay mouth bar, wave-cut terrace, groin, and jetty.

Learning Outcomes

- 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
- Use computer and emerging technologies effectively
- Describe how natural systems function and recognize the impact of humans on the environment