

**Miami-Dade Community College**  
**PSC 1515- Energy in the Natural Environment**

Course Description: This course focuses on the investigation of the flow of energy through the natural environment including the atmosphere, hydrosphere and lithosphere along with the basic chemical and physical principles needed to understand the concepts introduced.

**3 credits**

Prerequisites and Co-requisites: none \_\_\_\_\_

Course Competencies: Competencies are divided into required and optional objectives and are grouped for organizational rather than instructional purposes.

**Competency 1: The student will understand the basic methodology of science.**

The student will be able to

(Required objectives)

- a. Describe the scientific method by differentiating between hypothesis, theory, law and experiment and by giving examples of each.
- b. Discuss and describe scientific measurement including SI units, accuracy and precision.

(Optional objective)

- c. Differentiate between those areas considered “science” and those considered “non-science”

**Competency 2: The student will understand basic chemical and physical principles.**

The student will be able to

(Required objectives)

- a. Define and give examples of different types of potential and kinetic energy including but not limited to chemical, heat, electromagnetic, nuclear, mechanical and electrical forms of energy
- b. Relate the First and Second Laws of Thermodynamics to the flow of energy in the natural environment.
- c. Describe parts of the atom including protons, neutrons and electrons, their relative masses, their charges and their locations in the atom.
- d. Recognize some common chemical elements with their symbols and discuss their periodic relationships.
- e. List the properties of ionic and covalent bonding as they relate to the formation of molecules and compounds.
- f. Describe the process of nuclear fusion and relate it to production of energy by the sun.
- g. Describe the process of nuclear fission as it relates to energy production.

Competency 3: The Student will demonstrate comprehension of the structure and composition of the earth including its atmosphere, oceans, and rocks.

The student will be able to:

(Required objectives)

- a. List the structure and composition of the earth's atmosphere.
- b. Differentiate the major zones of the atmosphere including the troposphere, stratosphere, mesosphere and thermosphere.
- c. Explain the causes of air movement within the troposphere and their influences on global pressure systems, climatic zones and local weather.
- d. Describe the hydrologic cycle, both globally and locally, by distinguishing among surface, subsurface and atmospheric movement of water.
- e. Relate the surface and subsurface oceanic circulation patterns to atmospheric patterns, the earth's rotational forces and climatic events.
- f. Explain the theory of plate tectonics and describe the various types of plate boundaries.
- g. Describe the movement of energy within and upon the Earth including the structure of the lithosphere and aethenosphere (sp?) and the movement of heat therein.
- h. Use a map or globe to locate and define: North and South Poles, the equator, the Tropics of Cancer and Capricorn, the Artic and Antarctic Circles, lines of latitude and longitude, the Prime Meridian and the International Dateline, and the Tropic, Temperate and Arctic Zones.

(Optional objectives)

- i. Describe the structure, composition and dynamics of the earth's oceans and seas.
- j. Discuss current theories on the origin and evolution of the universe and stars/solar systems.
- k. List the major mineral and hydrological resources and describe some of the problems connected with their use.
- l. Describe various weather systems.

Competency 4: The Student will understand the movement of energy through the biosphere.

The student will be able to:

(Required objectives)

- a. Explain trophic level organization by describing the flows of energy through terrestrial and aquatic environments.
- b. Explain photosynthesis and respiration as they pertain to energy flow through the natural environment.
- c. Analyze the major biogeochemical cycles including the carbon, nitrogen and phosphorus cycles.

(Optional objectives)

- d. Outline at least one scientifically acceptable hypothesis of the origin and evolution of life.
- e. Discuss the strengths and weaknesses of the Gaian Hypothesis.

Competency 4: The Student will demonstrate knowledge of the effect of population on the Earth's energy resources.

The student will be able to:

(Required objectives)

- a. Differentiate between and give examples of renewable and non-renewable resources (with emphasis on energy related resources).
- b. Compare and contrast the strengths and weaknesses of energy sources, including but not limited to, fossil fuels, nuclear fission and fusion, hydroelectric, wind, solar, waste conversion, hydrogen, ocean technology, tides and biomass.
- c. Describe and give examples of conservation and recycling as a strategy to extend available energy and other natural resources.
- d. Describe the effects of continued population growth on the world's energy resources.

(Optional objectives)

- e. Describe the changes in the use of energy in the US over the past 200 years.
- f. Develop a plan to minimize personal energy and material resource use.
- g. Discuss the effects of pollution and resource depletion on the atmosphere, hydrosphere and lithosphere.
- h. Discuss how science can be used to avoid or resolve environmental problems.

Revised Jan 02, 2001