

## **Course Description**

### **PSC1515 | Energy in the Natural Environment | 3.00 credits**

This course is an investigation of the physical environment using energy as a theme to demonstrate the impact of science and technology on the environment and on the lives of people.

### **Course Competencies:**

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

1. Describing the scientific method, differentiating between hypothesis, theory, law and experiment and giving examples of each
2. Discussing and describing scientific measurement including SI units, accuracy and precision
3. Differentiating between those areas considered science and those considered non-science

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

1. Defining and giving examples of different types of potential and kinetic energy including but not limited to chemical, heat, electromagnetic, nuclear, mechanical and electrical forms of energy
2. Relating the first and second laws of thermodynamics to the flow of energy in the natural environment
3. Describing parts of the atom including protons, neutrons and electrons, their relative masses, their charges and their locations in the atom
4. Recognizing some common chemical elements with their symbols and discussing their periodic relationships
5. Listing the properties of ionic and covalent bonding as they relate to the formation of molecules and compounds
6. Describing the process of nuclear fusion and relate it to production of energy by the sun
7. Describing 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 by:

1. Listing the structure and composition of the Earth's atmosphere
2. Differentiating the major zones of the atmosphere including the troposphere, stratosphere, mesosphere and thermosphere
3. Explaining the causes of air movement within the troposphere and their influences on global pressure systems, climatic zones and local weather
4. Describing the hydrologic cycle, both globally and locally, by distinguishing among surface, subsurface and atmospheric movement of water
5. Relating the surface and subsurface oceanic circulation patterns to atmospheric patterns, the earth's rotational forces and climatic events
6. Explaining the theory of plate tectonics and describing the various types of plate boundaries
7. Describing the movement of energy within and upon the earth including the structure of the lithosphere and asthenosphere (sp?) And the movement of heat therein
8. Using a map or globe to locate and define: north and south poles, the equator, the tropics of cancer and Capricorn, the arctic and Antarctic circles, lines of latitude and longitude, the prime meridian and the international dateline, and the tropic, temperate and arctic zones
9. Describing the structure, composition and dynamics of the Earth's oceans and seas
10. Discussing current theories on the origin and evolution of the universe and stars/solar systems
11. Listing the major mineral and hydrological resources and describing some of the problems connected with their use
12. Describing various weather systems

**Competency 4:** The student will understand the movement of energy through the biosphere by:

1. Explaining trophic level organization by describing the flows of energy through terrestrial and aquatic environments
2. Explaining photosynthesis and respiration as they pertain to energy flow through the natural environment
3. Analyzing the major biogeochemical cycles including the carbon, nitrogen and phosphorus cycles
4. Outlining at least one scientifically acceptable hypothesis of the origin and evolution of life
5. Discussing the strengths and weaknesses of the Gaian hypothesis

**Competency 5:** The student will demonstrate knowledge of the effect of population on the Earth's energy resources by:

1. Differentiating between and giving examples of renewable and non-renewable resources (with emphasis on energy related resources)
2. Comparing and contrasting 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
3. Describing and giving examples of conservation and recycling as a strategy to extend available energy and other natural resources
4. Describing the effects of continued population growth on the world's energy resources
5. Describing the changes in the use of energy in the US over the past 200 years
6. Developing a plan to minimize personal energy and material resource use
7. Discussing the effects of pollution and resource depletion on the atmosphere, hydrosphere and lithosphere
8. Discussing how science can be used to avoid or resolve environmental problems

**General Education 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