

# Minnesota State University Moorhead

## PSCI 378: Energy and the Environment

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: Goal 10 - People/Environment, Goal 03 - Natural Science

This course will examine the relationships between civilization, society and energy use. This will be accomplished by examining current and possible future energy sources as developed through the sciences of physics and chemistry and their applied technologies. It will then examine the applications of current sources and their effects on society and world ecosystems. Finally the course will examine how societies change and adapt, and look at possible steps to a sustainable energy and environmental future. MnTC Goal 3 and 10.

### B. COURSE EFFECTIVE DATES: 01/10/2011 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Energy Conservation: Energy may be transformed but it is always conserved. Typically energy is transformed into less useful forms. How do you create, store and use energy?
2. Three Laws of Thermodynamics: The laws of thermodynamics determine fundamental processes limiting the efficiencies of engines. How does a heat engine and a steam engine work? What is maximum efficiency of an engine?
3. Environmental Justice: What are the benefits and consequences of various energy sources? Is there a way to supply the energy required for our culture sustainably? How do different energy sources affect ecosystems?
4. Historical Context: How have past cultures failed or survived based on their energy use and environmental stewardship? How have cultures changed and adapted to new paradigms?

### D. LEARNING OUTCOMES (General)

1. Understand science as a human endeavor, the nature of scientific knowledge, and the historical perspective of scientific argument.
2. Know and apply the understandings and abilities of scientific inquiry to identify questions and concepts that can be explored. Evaluate scientific investigations; compare the use of multiple types of inquiry for answering questions; evaluate alternative explanations and models based on evidence, current scientific understanding, and logic; and communicate and defend a scientific argument.
3. Use scientific understandings and abilities when making decisions about personal and societal issues.
4. Know and apply the fundamental concepts and principles of physics concerning energy conservation and thermodynamics and be able to apply these concepts to address issues of human sustainability.

## **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

### **Goal 10 - People/Environment**

1. Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems.
2. Discern patterns and interrelationships of bio-physical and socio-cultural systems.
3. Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges.
4. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.
5. Propose and assess alternative solutions to environmental problems.
6. Articulate and defend the actions they would take on various environmental issues.

### **Goal 03 - Natural Science**

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

None noted