

# Minnesota State University Moorhead

## PHYS 302: Sustainable Energy-Science and Application

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: \*.\*

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course provides an overview of the science involved in renewable energy and the application of that science. The student will gain an understanding of the science involved in energy production, energy storage, and energy conservation. They will complete a group project in developing their own design in one of the sustainable technologies. This course does not count as an elective for the B.S. degree in Physics. Student must have completed MATH 127 or other College Algebra or higher course.

**B. COURSE EFFECTIVE DATES:** 08/22/2011 - 05/15/2020

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Science and Design of Solar Energy Technologies
2. Peak oil theory
3. Electrical production (generators, alternators), consumption (heating and electric motors) and distribution (on and off grid)
4. Design Theory of Wind Energy Conversion Systems
5. Conservation of Energy Resources
6. 1st and 2nd laws of thermodynamics
7. Heat Engines and Biomass Conversion

### D. LEARNING OUTCOMES (General)

1. Expected to demonstrate an understanding of the solar technologies, the science behind them, and their application.
2. Demonstrate an understanding of conservation methods to reduce our energy needs.
3. Demonstrate an ability to complete a group research activity on their own design of a sustainable technology.

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

None

### F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

### G. SPECIAL INFORMATION

None noted