

Common Course Outline for: Physics 1001 Energy, Climate & Physics in Society

A. Course Description:

1. Number of Credits: 3
2. Lecture hours per week: 3
Lab hours per week: 0
3. Prerequisites: None
4. Co-requisites: None
5. MnTC Goals: Goal 3 Natural Science and Goal 9 Ethical and Civic Responsibility

This course covers topics in physics with an emphasis on conceptual understanding of physics principles and the technology applications related to current issues, including the sources and uses of energy, climate change, and the ethical dimensions of technological choices. This course will give students the solid foundation in physics they need to be critically thinking, scientifically literate citizens able to distinguish scientifically sound, evidence-based technological decisions from those that are not. Topics may include energy production and conservation, radioactivity and nuclear weapons, transportation options, various consequences of climate change, and invisible light. The personal, political, and ethical dimensions of technological choices will be a significant emphasis in this course. Lecture 3 hours; lab 0 hours.

Meets Minnesota Transfer Curriculum Goals 3 and 9 (PHYS 1001 and PHYS 1002 together satisfy the goal 3 laboratory requirement.)

B. Revised: January 2018

C. Outline of Major Content Areas

Physics topics: Physics topics are chosen from physics, including energy and climate, that are relevant to our society and to the choices we make as citizens.

Applications: Technological applications are selected that relate to the chosen physics topics, including energy and climate, and may include energy production and conservation, radioactivity and nuclear weapons, transportation options, consequences of climate change, and invisible light.

Ethical and Civic Responsibility: The personal, political, and ethical dimensions of various technological solutions to current issues will be a significant emphasis in this course.

D. Course Learning Outcomes

Upon successful completion of this course students will be able to:

1. Demonstrate an understanding of scientific theories and principles by (2b-c, 3a):
 - a. Stating and applying the fundamental laws and concepts relating to the course topics.
 - b. Identifying how physical laws and principles are applied to various applications.

- c. Using the appropriate physics concepts to qualitatively analyze real world problems or situations.
 - d. Using the terminology of physics correctly.
2. Formulate and test hypotheses by (2a-c, 3b):
 - a. Accessing data and analyzing it.
 - b. Identifying sources of error and uncertainty.
 3. Communicate experimental findings, analysis, and interpretations by (2a-c, 3c):
 - a. Orally explaining analyses and interpretations of data and relating the results to physics concepts.
 - b. Presenting written reports that interpret data and relate data to physics concepts.
 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 by (2b-d, 3d, 9a-e):
 - a. Examining the underlying assumptions behind scientific predictions regarding current issues.
 - b. Identifying the inherent uncertainty in the expected impact of technological solutions to current issues.
 - c. Applying scientific principles to ideas and distinguishing between myth and what is possible.
 5. Identify, discuss, and reflect upon the ethical dimensions of political, social, and personal life and understand the ways in which they can exercise responsible and productive citizenship by (9a-e):
 - a. Examining, articulating, and applying their own ethical views to decisions and choices involving technology.
 - b. Understanding and applying physics concepts to specific issues that can be addressed with technology.
 - c. Analyzing and reflecting on the ethical dimensions of scientific issues.
 - d. Recognizing the diversity of political motivations and interests of others and how they affect decisions and choices involving technology.
 - e. Identifying ways to exercise the rights and responsibilities of citizenship when making choices affected by science and technology.

E. Methods for Evaluating and Assessing Student Learning: Evaluation methods are at the discretion of the instructor and may include oral and/or written reports, homework, quizzes, exams, and a final exam.

F. Special Information:

Beginning in Fall 2017, PHYS 1002, combined with PHYS 1001, meets the following Board of Teaching Standards: ELEM J2b, ELEM J2c, ELEM J2e, ELEM J3, ELEM J4, and ELEM J5. Both courses must be successfully completed to satisfy all of the standards listed. The table that follows indicates the course learning outcomes and course topics meet the BOT standards.

Board of Teaching Standard	PHYS 1001 Course Learning Outcomes	PHYS 1002 Course Learning Outcomes	Combined Course Learning Outcomes
ELEM J2B	1, 2, 3	1-5, 8	1, 4-6
ELEM J2C		1-8	4-6
ELEM J2E	1, 4		
ELEM J3	1, 4, 5		
ELEM J4	4, 5		
ELEM J5: Which course contains each topic is indicated below	1	1	
	Properties of and changes in matter	Position, Motion	
	Force	Force	
	Light	Electricity and Magnetism	
	Heat		
	Kinds of, and ways to transfer, energy		