

Received: July 12, 2013

1. College: Sciences and Mathematics

2. Department: Physics and Astronomy

3. Course Status: New Course

4. Course Prefix and Number: PHY 100

5. Course Title: Physics in Society

6. Course catalog description:

This course covers the most interesting and important topics in physics of the twenty-first century and the use of scientific skills and critical thinking in science. The course stresses conceptual understanding with applications to current events. Topics may include Green Energy, Medical Physics, Nuclear Weapons, and Global Warming. This course does not meet graduation requirements for students majoring in the College of Sciences and Mathematics. This is a three credit hour course with two hours of lecture and three hours of lab per week. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and lab. Co-requisite: PHY 100L.

7. Number of semester credit hours: 3

8. Estimated enrollment per year: 60

9. Course prerequisites: Corequisite: PHY 100L

10. Course will be available online

11. Foundational Component Area: Life and Physical Sciences

12. Explain why this course fits into this foundation component area: This course focuses on explaining, predicting, and describing the nature and properties of matter and energy using the scientific method. Students will develop an understanding of the most interesting and important topics in physics of the twenty-first century such as medical imaging, alternative energy sources, radioactivity and its uses, nuclear power (and waste), nuclear weapons, ballistic missile defense, global warming, and natural disasters. In order to understand these topics, students will develop critical thinking skills in order to distinguish between fact and opinion using scientific principles. These skills will also allow the student to make inferences, identify assumptions, access the reliability of a source, and recognize bias and fallacy. By studying twenty-first century physics, students will develop an understanding of the fundamental constituents of the universe, the forces and interactions they exert on one another, and the results produced by these interactions. The topics covered involve implications of scientific principles on the physical world (e.g. global warming) and on human experiences (e.g. medical imaging such as X-rays and CAT scans).

This course is modeled after a course taught at the University of California at Berkeley by Richard A. Muller titled "Physics for Future Presidents: The Science Behind the Headlines." The course is an introduction to the essential physics that every world leader, CEO, and informed citizen can use to help them make better decisions and judgments about current events in their lives.

13. Core Objectives

- **Critical Thinking-** In the lecture part of this course, students will be instructed on the elements of critical thinking that will improve their ability to describe, explain, and predict physics phenomena using the scientific method. This instruction will be early in the semester and will take place through assigned readings and instructor led lectures that include discussions with the class. Mastery of critical thinking skills will be demonstrated in **The Global Warming and the Greenhouse Effect Project**. This project is an experiment in the co-requisite lab, but unlike other experiments performed during the semester, students will be given two weeks to submit a formal, detailed write-up. The project will require the students to identify a problem (inquiry), collect the relevant data, and draw conclusions (evaluation and synthesis) from the results. **The Global Warming and the Greenhouse Effect Project** will be used to address the mastery of all of the skills associated with the four core requirements for the life and physical sciences.
- **Communication Skills-** In the lecture portion of this course students will be taught communication skills which will include effective development, interpretation, and expression of ideas through written and visual communications. Lectures and instructor led class discussions will be used to accomplish this. Students will practice and demonstrate these skills in **The Global Warming and the Greenhouse Effect Project** mentioned above. The formal lab report associated with this project will require each student to write results and draw conclusions (written communications) based on data tables and graphs (visual) produced in the exercise.
- **Empirical and Quantitative Skills-** Data analysis is a crucial part of the scientific method. In the co-requisite lab course students will be taught how to correctly collect and analyze scientific data. Their empirical and quantitative skills will improve with each experiment. They will learn how to make accurate measurements, do necessary calculations, and perform error analyses. Mastery of these skills will be demonstrated in **The Global Warming and the Greenhouse Effect Project** where students will have two weeks to complete a formal written report of an experiment. This written report will include manipulation and analysis of numerical data and informed conclusions.
- **Teamwork-** The skills necessary to be part of an effective team will be taught in the lecture portion of this course. The instructor will use lecture, assigned reading, and class discussions to help students form the ability to consider different points of view and to

work effectively with others. Teamwork skills will be practiced throughout the 11 laboratory experiments conducted in the co-requisite lab. Mastery of teamwork will be demonstrated in **The Global Warming and the Greenhouse Effect Project** toward the end of the semester. This project involves an experiment where successful teamwork is required to conduct the experiment. Each team member must be willing to consider the points of view of others and to work effectively with team members to develop a proper experimental procedure to accomplish their goal. Data will be collected as a team. The take-home portion of this project will involve individual efforts to plot and analyze the data and draw conclusions.

Contact person for questions about this submission:

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