

Received: July 12, 2013

1. College: Sciences and Mathematics

2. Department: Physics and Astronomy

3. Course Status: Existing; requires modification

4. Course Prefix and Number: PHY 242

5. Course Title: Technical Physics II

6. Course catalog description:

Topics covered include electrical and magnetic phenomena, light and optics. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and lab. Prerequisite: PHY 241. Co-requisite: PHY 242L.

7. Number of semester credit hours: 3

8. Estimated enrollment per year: 50

9. Course prerequisites: PHY 241, Co-requisite: PHY242L

10. Course is not available online

11. Foundational Component Area: Life and Physical Sciences

12. Explain why this course fits into this foundation component area:

Physics 242 is a theoretical and experimental investigation of electricity, magnetism, light and optics. In this course students will use the fundamental concepts and principles of electricity, magnetism, light and optics to solve various problems of historical and practical importance to our understanding of the world and universe in which we live. Students will utilize mathematical models and formulism, such as differential and integral calculus, to describe phenomena. Students will test the validity of their models and formulism through experimental measurements and/or experimental verification.

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 RC Circuits Investigation**. This investigation 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 investigation will require the students to identify a problem (inquiry), collect the relevant data, and draw conclusions (evaluation and synthesis) from the results. (**The RC Circuits Investigation** 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 these skills in **The RC Circuits Investigation** mentioned above. The formal lab write-up 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 RC Circuits Investigation** where students will have two weeks to complete a formal write-up of an experiment. This write-up will include manipulation and analysis of numerical data and informed conclusions.
- **Teamwork-** There are certain fundamentals to good teamwork. The nature of these skills will be taught in the lecture portion of this course where 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 12 laboratory experiments conducted in the co-requisite lab. Mastery of teamwork will be demonstrated in **The RC Circuits Investigation** toward the middle of the semester. This project involves an experiment where successful teamwork is required to set-up and conduct the experiment. Each team member must be willing to consider other's points of view and to work effectively with other members of the team to develop a proper experimental procedure to accomplish their goal. Data will be collected as a team. (The take-home part of this project will involve individual, not teamwork, efforts to plot and analyze the data and to draw conclusions.)

Contact person for questions about this submission:

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