

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 241
5. **Course Title:** Technical Physics I

**6. Course catalog description:**

Topics covered include kinematics, dynamics, linear motion, work and energy, rotational motion, gravitation, elasticity, simple harmonic motion, wave motion, sound, heat and thermodynamics. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and lab.

7. **Number of semester credit hours:** 3
8. **Estimated enrollment per year:** 60
9. **Course prerequisites:** Co-requisites: MTH 233, PHY 241L
10. Lecture 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 241 is a theoretical and experimental investigation of kinematics, dynamics, gravity, rotational and vibratory motion, and heat and thermodynamics. In this course students will be presented the foundational principles associated with these phenomena in order for them to predict, analyze and explain these phenomena (use the scientific method) as they are manifested in technology and in the natural environment in which they are immersed. Particular emphasis will be placed on the interplay between these topics and technology associated with the chemical, geological and mathematical professions using algebra, trigonometry, and calculus as mathematical tools.

**13. Core Objectives**

- **Critical Thinking-** In the lecture elements of critical thinking are presented to guide and enhance the student's ability to describe, explain, and predict physics phenomena using scientific discovery (the scientific method). This instruction will be early in the semester and will take place through assigned readings and discussions with the class. Mastery of critical thinking skills will be demonstrated in **The Newton's 2<sup>nd</sup> Law 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 Newton's 2<sup>nd</sup> Law 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 these skills in **The Newton's 2<sup>nd</sup> Law Project** 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 scientific discovery (the scientific method). In the co-requisite lab course students will be taught how to collect and analyze scientific data. Their empirical and quantitative skills will improve with each experiment. They will learn how to make accurate measurements, determine the appropriate calculations, and perform error analyses. Mastery of these skills will be demonstrated in **The Newton's 2<sup>nd</sup> Law Project** 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, error analysis, and arrival at informed conclusions.
- **Teamwork-** There are certain fundamentals to good teamwork. The nature of these skills will be presented in the laboratory portion of this course where the instructor will use assigned reading and class discussions to help students acquire 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 Newton's 2<sup>nd</sup> Law Project** 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 team, efforts to plot and analyze the data, perform error analysis, and draw conclusions.)

Contact person for questions about this submission:

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