University of South Carolina
Carolina Core

PHYSICS 212L
ESSENTIALS OF PHYSICS II LAB

BULLETIN INFORMATION
PHYS 212L - Essentials of Physics II Lab (1 credit hour)
Course Description:
Corequisite: Prereq or coreq: PHYS 207 or 212
Prerequisites: Prereq or coreq: PHYS 207 or 212

SAMPLE COURSE OVERVIEW
In PHYS 212L, the semester is divided into four blocks of time, called *cycles.* Each cycle is (for Summer Sessions one week long) three weeks long. During each cycle, two projects will be performed by each laboratory group. A lab group will work on their first project during day one. Before they leave each group will have their lab notebooks graded by the TA. This grade will serve as the preliminary lab report grade. The questions that are in the description will not be included in this grade. The second day of the cycle will be spent working on the project on the opposite side of the lab room, same row, as the first project. A preliminary lab report grade will be given by the TA for this project just as in day one. Day three will be used for oral presentations. Each student will give one oral presentation during the semester. For each cycle, every student will turn in two final lab reports, and a set of *Presentation Critiques.*

ITEMIZED LEARNING OUTCOMES
<u>**Upon successful completion of Physics 212L, students will be able to:**</u>
1. Perform a careful experiment, estimate the uncertainties, and present the results graphically.
2. Demonstrate use of the graph as an analysis tool. In particular, they should understand methods for finding the straight line and the uncertainties best representing the data.
3. Prepare technical material for oral presentation to a group of peers.
4. Demonstrate ability to make connections among the concepts taught in the lecture portion of the course, experiences from the 'real world', and the laboratory exercises.
5. Explain how the scientific method is used in the context of taking experimental data and using that data to support, or disprove a scientific hypothesis.
6. Explain concepts and principles involved in the labs, e.g.:
    a. Principles of circuits.
    b. Connection between electric current and magnetic field.
    c. Geometrical optics and the wave nature of light.
    d. Quantum properties of matter and light.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS
TBA

SAMPLE ASSIGNMENTS AND/OR EXAMS
1. 8 preliminary lab reports
2. 8 final lab reports
    a. Equipotentials: Equipotential contours for three geometries will be investigated to explore the relationship between potentials and electrical field lines
    b. Ohm's law: To study the relationship between the electrical current flowing through a circuit element and the voltage applied.
    c. Series and Parallel Resistance: To explore the relationship between voltage and current in networks of resistors connected in series and parallel. By the end of the lab you should have constructed **6** simple circuits: two in step 1, two in step 2, and two in step 3.
    d. Current Balance: To use the current balance to measure the mechanical forces exerted by electrical currents.
    e. Double Slit Diffraction: To use the diffraction pattern produced by a double slit to calculate the wavelength of the light source being used.
    f. Geometric optics or Balmer Series: To give the student an understanding of how to ray trace and to do calculations based on ray tracing for one and two lens systems. *Or* To study the spectrum of hydrogen and compare the observations to Balmer's formula.
    g. CD Diffraction: To calculate and compare the spacing between the tracks on a CD and a DVD by using the media as diffraction gratings.
    h. Optics of the Eye or Photoelectric Effect: To study the optical properties of the human eye using a model. In this experiment you will observe the properties of a "normal eye" and you will also investigate the methods used to correct visual defects. *Or* To determine Planck's constant from the photoelectric effect.
3. 4 sets of oral report critiques
4. 1 oral presentation

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS
TBA