

UNIVERSITY OF PUERTO RICO
RÍO PIEDRAS CAMPUS
COLLEGE OF NATURAL SCIENCES
DEPARTMENT OF PHYSICS

Title: Laboratory for Physics II

Code: PHYS 3174

Number of Credits: 1

Co-requisite: PHYS 3172 (Physics II)

Description

Laboratory course that provides experimental activities relevant to the Physics II course (PHYS 3172). The experiments are designed to be exploratory activities where the students learn from doing and observing, as opposed to following a recipe. Computers are employed for data collection, analysis, and report preparation.

Objectives

Through this laboratory course, the students will:

- operate and handle laboratory equipment properly
- apply safety precautions and procedures applicable to experiments
- use computers in the collection and analysis of experimental data
- identify the variables and constants in a problem situation
- make reasonable predictions or formulate hypotheses regarding the probable outcome of an experiment.
- use various techniques of graphical analysis to investigate the relationship between experimental variables
- plan and work in an organized and systematic fashion
- recognize the best way of collecting, recording, representing data and analyzing results.
- employ and discuss the concepts of experimental error, uncertainty, accuracy, discrepancy, random error, systematic error, reliability, percent error, etc.
- draw proper conclusions based on direct experimental evidence; to assess the range of validity of results and to show the correlation of experiment to theory.
- carry out experiments with minimal instruction
- write a clear, informative, and logical scientific reports.
- develop a laboratory experience and write a suitable manual for it
- give a practical/oral presentation of an independent lab project

(syllabus continuation: Laboratory for Physics II, PHYS 3174)

Course Content

- Week 1: Safety rules and introduction the lab equipment and computers
- Week 2: Calorimetry
- Week 3: Heat Engine
- Week 4: Thermal conductivity and expansion
- Week 5: The fuel cell
- Week 6: Electric field and voltage
- Week 7: Ohm's law, resistors in parallel and series
- Week 8: Kirchhoff's law
- Week 9: Magnetic field
- Week 10: RC and RLC circuits
- Week 11: Geometrical optics
- Week 12: Diffraction and refraction
- Week 13-14: Development of an independent project
- Week 15: Presentation of projects

Instructional Strategies

The experiments are designed to be exploratory activities where the students learn from doing and observing, as opposed to following a recipe. Laboratory reports are handed in at the end of each laboratory experience. Computers are employed as much as possible for data collection, analysis, and report preparation. At the end of the semester, pairs of students develop a laboratory experience of their own during two lab periods and present their project for the rest of the class in the last lab meeting. The presentation consists of a practical/oral explanation of the experiment and the corresponding written laboratory manual with diagrams and sample results.

Minimum Required Facilities

Laboratory room, computers, printer, interfaces, sensors, and laboratory equipment.

Student Evaluation

Ten laboratory reports count 5% each, for a 50%. The other 50% is given for the independent project: 25% for the practical/oral presentation and 25% for the laboratory manual.

Grading System

The overall score is determined by calculating the percentage of points obtained by the student, based on 80% lab reports and 20% exam grades. Grades are then assigned according to the standard curve: 100-90% = A, 89-80% = B, 79-70% = C, 69-60% = D, 59-0% = F.

Bibliography

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker, Wiley, 2002
2. Physics for Scientists & Engineers, Raymond A. Serway, Saunders Publishing, 2002
3. Physics, Douglas C. Giancoli, Prentice Hall, 2002

Rights of Students with Disabilities

UPR complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act 1990 (ADA) and the Commonwealth of Puerto Rico Law 51. Students receiving services through Rehabilitaci3n Vocacional must contact the professor at the beginning of the semester in order to plan for a reasonable accommodation and any required support equipment according to the recommendations given by the Oficina de Asuntos para las Personas con Impedimentos (OAPI) of the Dean of Students. Likewise, students with special needs that require some type of accommodation must contact the professor.