

UNIVERSITY OF PUERTO RICO
RIO PIEDRAS CAMPUS
COLLEGE OF NATURAL SCIENCES
DEPARTMENT OF PHYSICS
UNDERGRADUATE PROGRAM

Title: University Physics II

Code: PHYS 3012

Number of Credits: 3

Prerequisites: PHYS 3011, PHYS 3013

Corequisite: PHYS 3014

Description

This is the second part (Electricity and Magnetism) of the calculus-based introductory physics course for science majors. Topics include: Electrostatics, charges and fields; Conductors and insulators; Electric currents; Ohm's Law; Circuits; Magnetostatics, electromotive force; Ampere's Law; Electromagnetic induction; Electromagnetic waves; Geometrical Optics.

Esta es la segunda parte (Electricidad y Magnetismo) del curso de física introductoria con cálculo para estudiantes de ciencia. Incluye los temas: Electrostática, cargas y campos, Conductores y aisladores, Corrientes eléctricas, Ley de Ohm, Circuitos, Magnetostática, Fuerza electromotriz, Ley de Ampere, Inducción electromagnética, Ondas electromagnéticas, Óptica geométrica.

Objectives

After the completion of this course the student will:

- Explain the basic laws of physics and their range of application.
- Apply problem solving skills in physics and other disciplines.
- Use physical intuition to guess the character of a solution without actually solving the problem.
- Translate physical concepts into mathematical language.
- Develop critical thinking and conceptual understanding of phenomena.
- Show the relationship between mathematical descriptions and the understanding of physical phenomena.
- Explain the significance of models, theories and experiments in the scientific method.
- Provide the student with sufficient background in classical physics so that they can take elective courses offered in Modern Physics for non-majors as well as related courses in meteorology and astrophysics.

Course Content

Topic	Assigned time (hours)
1. Fluids	3
2. Fluids	3
3. Oscillations	3
4. Oscillations	3
5. Wave Motion	3
6. Electric Charge and Electric Field	3
7. Electric Charge and Electric Field	3
8. Gauss's Law	3
9. Electric Potential	3
10. Capacitance, Dielectrics, Electric Energy Storage	3
11. Electric Currents and Resistance	3
12. Electric Currents and Resistance	3
13. DC Circuits	3
14. Magnetism	3
15. Electromagnetic Induction and Faraday's Law	3
Total hours	45 contact hours

Instructional Strategy

The sections lecture class and laboratories are coordinated so that, although different professors give the instruction, students receive basically the same material. As well, the lecture and laboratory are coordinated with each other so that the student is introduced to the interaction between theory and experiment.

At present, one professor acts and coordinator of the lecture and the laboratory. Coordination of the lecture involves meeting periodically with the lecturers to assure that a uniform progress is made and to make adjustments in the schedule. This is necessary due to the many unexpected interruptions in the schedule with occur in Puerto Rico...Hurricanes, strikes etc. Coordination of the laboratory is a more complex situation. Most of the laboratory sections as given by Graduate Students who are Teaching Assistants. We have found that they need considerable training in how to present the material. This is accomplished by having them work through each laboratory prior to giving their class. This is done under the supervision of the coordination, once a week, in a three hours training period.

The strategy of instruction is to combine, lecture, laboratory experiment, audiovisual material, and demonstrations to convey the content of the course.

The student are assigned homework problems from the textbook to give them experience in problem solving and prepare them for the examinations.

Minimum Require Facilities

Traditional lecture room.

Student Evaluation

The lecture class has three partial departmental examinations, which consist of 16 multiple choice questions on each exam. Each question is valued 1 point, totaling 48 point.

In addition, each professor gives, during the semester a total of 12 questions in the form of QUIZZES. These are made by the individual professor and conform to the general material of the course.

Grading System

The student grade is determined by the formula $100 \times (\text{total points}) / 48$ where the maximum possible points are $48 + 12 = 60$. Grades are then assigned according to: begin {verbatim}

90% = A

80% = B

70% = C

60% = D

<60% = F

Two coordinated departmental exams are given in the laboratory. In addition, the laboratory section is divided into groups of two or three students. The group produced a combined report. The laboratory grade is based 70% on the laboratory reports and 30% on the exam grades.

Bibliography

Giancoli, D. C. 2008. Physics for Scientists and Engineers with Modern Physics, 4/e, Vol. II. Upper Saddle River, New Jersey: Pearson Prentice Hall.

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