Physics II

Course # DMNS 1052

Credits 4

Pre-requisites and Co-requisites: Physics I

Course Description

The Physics II course has been developed to meet the scope and sequence of UCA physics courses and gives a foundation for a career in computer science. The course advances the conceptual knowledge of students on electricity and magnetism, specifically electrical fields, capacitance, direct and alternating current, magnetic fields, and induction. Students practice solving problem sets on Kirchhoff's and Ohm's laws and analysis of linear and nonlinear resistive networks, temporal properties of RC circuits, RMS (root-mean-square) values of waveforms in addition to diodes and their applications.

Course Learning Outcomes

Upon completion of this course, students should be able to:

- Identify electric forces and fields for discrete charge distributions and their relevance to computer hardware and electronics.
- Analyse electric fields for complex charge distributions using Gauss's law, with applications in understanding electronic shielding and signal integrity.
- Calculate electric potential and capacitance, focusing on parallel plate capacitors and their roles in memory storage and circuit design.
- Describe the behaviour of passive and active circuit elements (resistors, capacitors, inductors, diodes, and transistors) in response to direct and alternating voltage sources, using Ohm's law, Kirchhoff's laws, and circuit analysis techniques critical for understanding digital and analogue circuits.
- Calculate magnetic fields from complex magnetic sources using Biot-Savart and Ampere's laws, with examples from electromagnetic interference (EMI) mitigation and magnetic storage devices.
- Calculate electromotive force using Faraday's and Lenz's laws of electromagnetic induction, with applications in power supplies and signal processing.
- Explain the physical structure, operation, and characteristics of diodes and transistors in simple electronic circuits, focusing on their role in logic gates, microprocessors, and integrated circuits.

Course Assessments and Grading

Item	**Weight**
Labs	10%
12 Homework	10%

Item	Weight
12 Quizzes	10%
Project	10%
Group Project	10%
Midterm Exam	20%
Final exam	30%