

SYLLABUS DEL CORSO

Experimental Physics for Ai 2

2324-3-E311PV019

Aims

Acquire the knowledge of electric and magnetic field and potential; Maxwell's equations, in both differential and integral form; and properties of dielectrics and magnetic materials. In addition to the theoretical subject matter, several experiments in electricity and magnetism are performed by the students in the laboratory.

Contents

The class begins with electrostatics, focusing on electric charge, fields, potential, and their applications. It then moves to magnetostatics, covering magnetic fields, forces, the Biot-Savart and Ampere's laws, and magnetic materials. Finally, electrodynamics is explored, including electromotive force, induced electric fields, Faraday's law, Maxwell's equations, electromagnetic waves, and their properties, along with the study of electric current, DC circuits, and the behavior of electromagnetic waves.

Detailed program

1. Electrostatics:
 - Electric charge, electric field, and Coulomb's law.
 - Gauss's law and its applications.
 - Electric potential, potential difference, and energy.
 - Conductors, dielectrics, and capacitors.
2. Magnetostatics:
 - Magnetic field and magnetic forces.
 - Biot-Savart law and Ampere's law.

- Magnetic materials and their properties.
- 3. Electrodynamics:
 - Electromotive force, induced electric fields, and Faraday's law of electromagnetic induction.
 - Maxwell's equations and their integral and differential forms.
 - Electromagnetic waves and their properties.
- 4. Electric Current and DC Circuits:
 - Electric current: Definition, Ohm's law, and resistance
 - DC circuits: Series and parallel circuits, Kirchhoff's laws, and circuit analysis techniques
 - RC circuits: Time constant, charging and discharging of capacitors
- 5. Electromagnetic Waves:
 - Plane waves and wave propagation.
 - Reflection, refraction, and dispersion of electromagnetic waves.
 - Waveguides and antennas.

Prerequisites

Experimental Physics for Ai, Calculus, Theoretical and computational linear algebra. Theoretical and quantum physics for Ai

Teaching form

Lectures and exercise sessions. Lab sessions.

Textbook and teaching resource

Introduction to electrodynamics
David J. Griffiths, Reed College. – Fourth edition.
pages cm
Includes index.
ISBN-13: 978-0-321-85656-2 (alk. paper)
ISBN-10: 0-321-85656-2 (alk. paper)

Semester

First Semester

Assessment method

Home works for self-evaluation, reports of the lab sessions, written or oral exam (tbd). The access to the exam is given by the presentation of the written report of one lab session.

Office hours

On appointment

Sustainable Development Goals

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE | CLIMATE ACTION
