



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Fisica II

1920-2-E2701Q060

Aims

The course gives the fundamentals of electromagnetism and optics as a tool for the understanding of the interactions between materials and electromagnetic fields, including light.

Contents

The course starts from the description of the interactions between charged systems and introduces the concepts of electric field, flux of electric field, electrostatic energy and potential, giving the formal elements for both an integral and differential description. The course gives then the basis for the description of charging processes in conductors and polarization effects in dielectrics with the fundamental quantities describing charge transport in the electric conduction processes. The analysis of moving charges brings to the introduction of the concept of magnetic field and the interaction between magnetic fields and moving charges, including charged systems with magnetic dipole moment. The course then analyses the electric and magnetic contributions arising from time dependent fields, finally giving the general framework of Maxwell equations in their integral and differential forms. From these equations, the wave equations for the electric and magnetic components of the electromagnetic radiation are obtained, with also the basis for the general analysis of optical signals as overlapping monochromatic components. Finally, the course gives a short analysis of the formal tools for the description of both geometrical optics and electromagnetic wave propagation.

Detailed program

Prerequisites

Basic knowledge of Mathematical analysis and Newtonian physics.

Teaching form

The course mainly comprises lectures in the classroom and includes sets of exercises of summary of the main three lecture blocks on electrostatic, electric currents and magnetism, and time dependent effects and optics, respectively.

Textbook and teaching resource

Reference textbook:

Elementi di fisica, Elettromagnetismo e onde – P. Mazzoldi, M. Nigro, C. Voci – EdiSES 2008

Additional resources:

Exercises with resolution on the e-learning platform.

Semester

First semester

Assessment method

Students must first demonstrate in a written test – usually composed by three or four exercises – to possess the formal tools for the description and quantification of situations in which charged systems and/or moving charges interact with each other and with either static or time dependent electromagnetic fields, and for the description of electromagnetic waves and simple optical systems. Test evaluation is communicated in few days before a second test consisting in an interview aimed at evaluating the acquired knowledge on the full program, specifically verifying the consciousness of the physical meaning of electromagnetic quantities and relationships.

Office hours

9:00-13:00 Monday, Friday

14:00-17:00 Friday
