Type of study : Bachelor in physics, Integrated studies- master professor of physics

Module title: Electrodynamics

Module type: Core

No ESPB: 7

Prerequisites : Electromagnetism, Fundamentals of Mathematical Physics

Module aims:
Students will affirm and broaden the previous knowledge in electromagnetism and give theoretical bases to follow future courses.

- Learning outcomes:

On completion of this module, student should be able to understand basic ideas and reasoning behind the development of mechanics and its application to other fields. Student should also be able to follow the literature in the field, analyse different solution and to choose the most adequate one, to find out the solution independently. Student will know basic laws of electrodynamics, as well as Maxwell equations for vacuum and material environment, energy relations in electrodynamics, as well as pondero-motoric action, laws of stationary electromagnetic field, propagation of electromagnetic waves in conducting and non-conducting environment and the laws of dipole radiation.

Syllabus:

Maxwell equations for vacuum. Transition to material environment. Average spatial and current density of charges. Maxwell equations for material environment. Complete system of equations. Electromagnetic potentials. Energy of electromagnetic field. Pondero-motoric forces. Electrostatics. Magnetostatics. Propagation of plane monochromatic waves. Retarded potentials. Radiation of dipole. Static and quasi-static fields. Electric and magnetic properties of the substance, diamagnetism, para- and ferromagnetism. Fast-moving fields and electromagnetic waves. Laws of macro-physical optics, electromagnetic theory of light, reflexion and refraction of light and diffraction of light. Dispersion of light, electromagnetic field in the cavity and heat radiation.

Reading list:

1. J. Jackson, Classical Electrodynamics, John Wiley, New York, 1975.

Contact hours: 3+2

Methods of delivery:
Lectures (3 hours per week), exercies (2 hours per week),