Study Program: Physics

Type and level of studies: Bachelor studies

Course name: Electrodynamics

Lecturer**: Tijana Kevkić**

Status: Compulsory

ECTS: 7

Attendance prerequisites:

Course aims

Acquiring basic knowledge of electrodynamics. Introduction to basic concepts and formulae of classical electrodynamics.

Course outcome

Acquiring knowledge about phenomena in the field of electrical and magnetic phenomena.

Course content

Theoretical part

Electromagnetic field equations and conservation laws: Point charge. Charge continuum. Continuitinity equation. Electromagnetic field. Field lines. Coulomb's law. Gauss's theorem. Biot-Savart- Laplace's law. Ampere's theorem. Faraday's law of induction. Maxwell's equations for the field in vacuum. Electromagnetic field potentials and their equations. Maxwell-Lorentz equations for a field in a material medium. Maxwell's stress tensor.

Covariant formulation of electrodynamics: Four-vectors of current density and potential. Field strength tensor. Laws of field intensity transformation. Electromagnetic field of a charged particle performing uniform motion. Field invariants. Particles in the electromagnetic field (effect, Hamiltonian and equations of motion). Covariance of Maxwell's and Maxwell-Lorentz equations. Invariance of Maxwell's equations in space and time inversion.

Electromagnetic waves: Wave equations. Plane, monochromatic, and monochromatic electromagnetic plane waves. Polarization of monochromatic plane waves. Doppler effect. Fourier field decomposition by plane monochromatic waves. Electromagnetic radiation in a cavity.

Constant current in an electromagnetic environment: Constant current in a conductor. Elementary conductivity theory. Hall effect. Alternating electromagnetic field in a material medium: Various forms of medium dispersion. Isotropic stationary media with time dispersion. Dispersion of dielectric permeability and conductivity. Kramers-Kronig relations. Electromagnetic waves in a homogeneous medium. Wave motion and group speed. Electromagnetic wave propagation in an anisotropic medium.

Practical part

Performing computational tasks adapted to theoretical classes.

Literature

1. Божидар Милић, Максвелова електродинамика (Студентски трг, Бор, 2002)
2. Милан В. Курепа: Основи структуре атома
3. Е. В. Шпољскиј: Атомска физика
4. В. Н. Кондратјев: Структура атома и молекула
5. Јагош М.Пурић, Ђ.Стеван И. Ђениже: Збирка решених задатака из Атомске физике
6. Јурић М.: Атомска физика
7. Божидар В. Станић, Михаило И. Марковић: Збирка решених задатака из Атомске физике
8. Божидар Милић, Збирка задатака из теоријске физике, II део (БИГЗ, Београд, 1971)

Number of active classes				Other classes
Lectures: 3	Practical classes: 2	Other forms of teaching:		

Teaching methods

Lectures (3 classes per week during the semester), computational exercises at clinics (2 classes per week) during the semester.

Assessment (maximum 100 points)

Course assignments	**points**	Final exam	**points**
Lectures	10	written exam	30
Laboratory exercises	20	oral exam	40
Seminars		.....	
Total	**30**		*70*