Level: bachelor

Course title: Selected chapters in mechanics and electrodynamics

Status: elective

ECTS: 6

Requirements: Introduction to theoretical physics

Learning objectives

Deepening knowledge in certain areas of classical mechanics and electrodynamics.

Learning outcomes

After taking the course, students should have developed:

General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects.

Subject-specific capabilities:

- posing variational problems
- using the Noether's theorem
- canonical formalism and Hamilton- Jacobi method
- solving the equation of electromagnetic potentials
- knowing the covariant formulation of electrodynamics
- deriving the equations from the variational principles in electrodynamics

Syllabus

Theoretical instruction

Variational methods: synchronous variations and unconstrained and constrained variational problems; asynchronous variations and conservation laws through Noether's theorem. Canonical transformations and Hamilton-Jacobi method. Green's functions for Poisson's equation and wave equation of electromagnetic potentials. Retarded potentials, Liénard-Wiechert potentials, and Larmor formula. Covariant formulation of electrodynamics. Variational problems in electrodynamics.

Practical instruction

Problem solving sessions

Weekly teaching load				**Other:**
Lectures:	**Exercises:**	**Other forms of teaching:**	**Student research:**	
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