

Level: bachelor			
Course title: Introduction to Theoretical Physics			
Status: obligatory			
ECTS: 7			
Requirements: Mathematics I, Mathematics II, Mechanics			
Learning objectives Acquiring the basic knowledge of laws of classical mechanics and electrodynamics.			
Learning outcomes After taking the course, students should have developed: General abilities: the basic knowledge in the area, application in other subjects, following expert literature, analysis of different solutions and selection of the most adequate solution. Subject-specific abilities: knowing the application of basic dynamical equation of motion of particle affected by force. Knowledge of the bases of Lagrange and Hamilton formalism. Knowing the laws of motion of rigid bodies. Knowing the basic laws of electrodynamics, as well as Maxwell equations for vacuum and material medium. Knowing energy relations in electrodynamics as well as ponderomotive effects, basic laws of static electromagnetic field, propagation of electromagnetic waves in conductive and non-conductive medium and law of radiation of dipole.			
Syllabus <i>Theoretical instruction</i> Kinematics of particle. Newton's laws of mechanics. Isolated and non-isolated systems. The basic equation of dynamics of particle. Differential equations of motion of systems of particle. Work and effect of forces. Conservative forces. The law of kinetic energy, momentum and moment of momentum of system. Free and compulsory motion of system. Reactions and the type of reactions. D'Allembert-Lagrange principle. The method of generalized coordinates. Lagrange equations. Hamilton principle. Hamilton equations. The motion of rigid body. The relative motion. Maxwell equations for vacuum. Transition to material medium. Mean current and charge density. Maxwell equations for material medium. Complete system of equations. The consequences of Maxwell equations. Electromagnetic potentials. The energy electromagnetic fields. Ponderomotive forces. Electrostatic. Magnetostatics. The propagation of plane monochromatic waves. Retarded potentials. The radiation of dipole. <i>Practical instruction</i> Problem solving sessions.			
Weekly teaching load			Other:
Lectures: 4	Exercises: 3	Other forms of teaching: 0	