Level: bachelor	

Course title: MECHANICS
Status: obligatory
ECTS: 8
Requirements: none

Learning objectives

Studying the physical laws describing the motion of macrophysical bodies with the aim to make students capable to follow the lectures of physics courses of all modules at higher years of studies.

Learning outcomes

After completing the course, students should develop:

General abilities: students are trained to correctly perform experimental exercises and treat the data obtained as their results, as well as to solve numerical problems.

Specific abilities: successful students should master knowledge about the basic physical laws of mechanics, oscillations and waves.

Syllabus
Theoretical instruction
The aims and method of the experimental physics. Physical quantities and their measurement. Basic concepts of kinematics. Dynamics of the point mass. Newton' s laws of motion. Friction force. Galileo's relativity. Rotational motion. Non-inertial reference frames. The work. Energy, law of conservation of energy. Newton's law of gravity. The forces due to deformation of solid bodies.
The law of conservation of the momentum, collisions. Centre of mass. Kinematics of the mass point in the plane, rotation. Dynamic of free and bound mass point.
Galilean relativity principle. Non-inertial reference frame. Rigid body dynamics. The law of conservation of the angular momentum. Gyroscopic effect. Linear harmonic oscillator. Physical pendulum. Damped and forced oscillations. Propagation, equation and properties of mechanical waves. Sound waves. Doppler effect. Elements of fluid statics and dynamics. Surface tension and viscosity.

Practical instruction
Selected experimental exercises in Mechanics: Measurement of length and time intervals. Mass measurement. The determination of the density of liquid and solid bodies. Hooke's law of elasticity. Atwood machine. Mathematical pendulum. Determination of the moment of inertia. The determination of the coefficient of surface tension using microbalance. The determination of the coefficient of viscosity using Stokes and Ostwald method. The determination of the sound waves velocity using resonant method.
Problem solving sessions in all parts of Mechanics. Obligatory homework (three times 10 problems).

Weekly teaching load				Other:
Lectures: 3	Exercises: 1	Other forms of teaching: 2	Student research:	