Study Program: Physics

Type and level of studies: Bachelor studies

Course name: Physical Mechanics

Lecturer**: Odalović Mihajlo**

Status: Compulsory

ECTS: 10

Attendance prerequisites:

Course aims

Studying the laws of physics describing the movement of macro bodies to prepare students for attending more demanding courses in the higher years of study.

Course outcome

Introduction of basic principles and laws of classical mechanics. Solving of specific experimental and computational problems in the macro body motion area. Explaining the manner of using the simple measuring instruments. The applying knowledge from different areas of classical physics. Preparing students to understand more complex laws of physics in higher years of study.

Course content

Theoretical part

Subject of study and division of physics. Physical quantities and their measurement. Kinematics. Kinematics of translatory motion of a material point. Kinematics of rotational motion of a material point. Dynamics. Newton's laws of dynamics. Inertial systems. Forces in curvilinear motion. Limits of applicability of the laws of classical dynamics. Specific weight and density. Friction. Non-inertial coordinate system. The law of conservation of momentum. Mechanical work and power. Mechanical energy and the law of conservation of mechanical energy. Collisions. Rotational dynamics of solid body movements. Basic equation of dynamics of rotational motion of a rigid body. Moment of inertia. Steiner's theorem. Rotation around a free axis. Gyroscopes. Newton's law of universal gravitation. Cosmic velocities. Fluid mechanics: Stationary flow. Bernoulli's equation and its application. Internal friction in liquids. Viscous fluid flow through the circular pipe. Poiseuille's law. *Fluid statics*. Hydrostatic pressure. Pascal's law. Archimedes' principle of buoyancy. Elastic deformations. Mechanical oscillations: the simple harmonic motion. Simple harmonic oscillator equation. Mathematical pendulum. Physical pendulum. Velocity and acceleration in simple harmonic motion. The energy of the harmonic oscillator. The composition of two harmonic motions. Free, forced and damped oscillation. Resonance. Mechanical wave. Sound waves. The Doppler effect.

Practical part

Selected experimental laboratory exercises in mechanics: Determination of the friction coefficient; Determining the specific density of solids using hydrostatic weighing; Determining specific liquid density using a hydrometer; Determination of the viscosity coefficient using capillary tube; Determining the elastic modulus; Determining the acceleration g using the mathematical pendulum. Computational exercises from all fields of mechanics.

Literature

1. В. Вучић, Д.Ивановић: Физика I, Научна књига, Београд, 1989.
2. Ф. W. Сеарс: Механика, таласно кретање и топлота, Научна књига, Београд, 1962
3. С. Е. Фриш, А. В.Тиморјева, Курс опште физике, Завод за издавање уџбенике СР Србије, Београд,1969.
4. В.Вучић: Основна мерења у физици, Научна књига, Београд 1970.
5. Б.Јакупи, Р.Тутунџију, Збирка решених задатака из Механике и термодинамике, Завод за издавање уџбеника, Приштина,1998.

Number of active classes				Other classes
Lectures: 4	Practical classes: 2	Other forms of teaching: 2		

Teaching methods

Lectures (4 classes per week during the semester), experimental exercises at clinics (2 classes per week) and laboratory exercises (2 classes per week) during the semester.

Assessment (maximum 100 points)

Course assignments	**points**	Final exam	**points**
Lectures	10	written exam	30
Computational exercises	10	oral exam	30
Laboratory exercises	20	.....	
Total	**40**		*60*

Two term tests which include theoretical questions and computational problems: 2x30=60 points