Level: bachelor

Course title: Oscillations and Waves

Status: elective

ECTS: 6

Requirements: none

Learning objectives

Study of the phenomena of oscillations and their propagation in the material media in the form of the mechanical waves.

Learning outcomes

After completing the course, students should develop:

General abilities: following professional literature, using the Internet, preparation and presentation of a seminar paper.

Specific abilities: obtaining knowledge about the various kinds of oscillatory motion and their mathematical formulation. Understanding of the concept of wave motion and various phenomena related to wave propagation.

Syllabus

Theoretical instruction

Forces due to the deformation of solid bodies. Hooke's law. Deformation of the spring. Harmonic force. The motion of the point mass under the action of the harmonic force. Energy of the harmonic oscillator. Oscillations of the point mass within the plane. Mathematical and physical pendulum. Composition of the harmonic oscillations. Circular motion. Elliptic oscillations-Lissajout figures.

Damped and forced oscillations. Resonance.

Propagation, equation and properties of the mechanical waves. The concepts of wavelength and wave number, frequency and period. The velocity of progressive waves. Energy of mechanical waves. Superposition principle. Fourier analysis. Wave dispersion. Wave interference. Standing wave. Sound waves, sound velocity. Sound intensity and intensity level. Doppler effect.

Practical instruction

Selected experimental exercises: Determination of the shear stress module of the wire by static method. Torsion pendulum. Harmonic oscillations (determination of the elastic constant of a spring). Physical pendulum. Monochord. Measurement of the resonant curve.

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