Level: bachelor

Course title: Physics of condensed matter

Status: obligatory

ECTS: 7

Requirements: Contemporary experimental physics I and Contemporary experimental physics II

Learning objectives

Acquisition of basic knowledge about models and methods in the field of physics of condensed matter, and potential applications of polymers, nanostructured and amorphous materials in modern technology and techniques.

Learning outcomes

After completing and mastering the course content, students should possess:
- Ability of analytical and scientifically based understanding of the physical processes in this area.
- Capacity to follow the relevant technical literature.
- Understanding of the basic conductive, magnetic and dielectric properties of solid materials.
- Ability to transfer the acquired knowledge to other individuals and groups.

Syllabus

Theoretical instruction

Electronic states in condensed systems. Crystalline and non-crystalline materials. Amorphous semiconductor materials. Amorphous metals. Boltzmann kinetic equation. Thermal conductivity. Lattice vibrations. Phonons. Mechanisms of heat transfer. Material behaviour in the thermal field, electric field, magnetic field and electromagnetic field. Measurements of thermal and electrical properties. Dielectrics. The behaviour of the dielectric constant in the field. Dielectrics in variable electric field. Ceramics. Classic and special ceramics. Magnetic properties of materials. Ferromagnetism, ferrimagnetism and antiferromagnetism. Modern magnetically soft and magnetically hard magnetic materials. Determination of magnetic and dielectric properties.

Practical instruction

Experimental and theoretical exercises follow the content of lectures.

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