

Title	Basics of Condensed Matter Physics (Podst. fiz. fazy skond.)	Code	1010401241010430705
Field	Fizyka Techniczna	Year / Semester	2 / 4
Specialty	-	Course	core
Hours	Lectures: 3 Classes: 2 Laboratory: - Projects / seminars: -	Number of credits	5
		Language	polish

Lecturer:

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Status of the course in the study program:

Core course of the study for Technical Physics, Faculty of Technical Physics.

Assumptions and objectives of the course:

- The introduction with basic physical connected from crystalline building of substances phenomena, the imperfection of crystal lattice, classification of materials and their proprieties as well as their theoretical description on academical level. The practice in students of habituation the thinking the physical categories on the basis of the connected from building of makings questions.

Contents of the course (course description):

- - The elementary quantum problems - the equation Schrödingera, barrier of potential, Bohr atom.
 - The crystalline building of substances - the unite cell, crystallographic plane and direction, crystalline symmetry, crystallographic system and lattices Bravaisa, the coefficients Millera.
 - The imperfection of crystal lattice - the point and line defect and dislocation, edge and screw dislocations, the energy of dislocation.
 - The classification of materials - the classification leaning on nature of atomic, metals, ceramics, polymers, composite, constructional and functional materials.
 - The materials structure - the phases change, building phases, microstructure.
 - The investigation of crystal structures - the X-ray, neutron and electron diffraction, the equation Lauego, the equation Braggga, the reciprocal lattice, construction Ewalda, the investigation of surface of crystals.
 - Crystalline bonds - valency bond, ion and metallic bond, hydrogen and molecular.
 - The lattice crystalline vibration - vibration one and two dimensional chain, the acoustic phonons, the optical phonons.
 - The specific heat of solid - the classic model, the Einsteina and Debye model, the Debye temperature, the specific heat of metals.
 - The energy band structure of solid - the adiabatic and one-electron approximation, approximal electrons strongly and poorly connected, energy band, the Brillouina zone, the effective mass.
- Semiconductors - intrinsic and impurity semiconductors.
 The conductivity of solid state - intrinsic and impurity conductivity, photoconductivity

The elastic constant of crystals - the analysis of strains and stresses, the elastic strain energy density, elastic waves in cubic crystal, connected with dislocations strains, the influence of strains on band structure.

Introductory courses and the required pre-knowledge:

- The basis of experimental physics and basis of mathematics in range of college.

Courses form and teaching methods:

- The guided in system of computer demonstration lecture, illustrated with the examples - experiences, films, as well as simulations computer diapositives.
- The practice exercise - the practical skills of resolution of physical questions.

Form and terms of complete the course - requirements and assessment methods:

- The lecture - the written examination from utilization of infliction of questions in computer system (the classic question as well as animation computer - displayed on-screen), the oral examination
- the possibility of improvement on principle of oral answer the opinion on set new questions
- The practice exercise - the written leaning on principle credit of resolution of and problems theoretical arithmetic tasks.

Basic Bibliography:

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Additional Bibliography:

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