Study Program: Physics				
Type and level of studies: Bachelor studies				
Course name: Introduction to Solid State Physics				
Lecturer: Tijana Kevkić				
Status: Compulsory				
ECTS: 7				
Attendance Prerequisites: Atomic Physics, Fundamentals of Quantum Mechanics				

Course aims

Acquisition of basic knowledge about models and methods in the condensed matter physics as well as the application of crystals, liquid crystals and quasicrystals, polymers, nanostructured and amorphous materials in modern technology and engineering.

Course outcome

By the end of the course, the students should:

- Understand the structure of the ordered state and the partially regulated state;
- Understand the basic physical properties of solid materials;
- Possessing the knowledge of the structural characteristics of nanostructured and amorphous materials;
- Possessing the knowledge of the methods for obtaining material in a condensed state and possibilities of application;
- Understand the basic magnetic and dielectric characteristics of solid materials;
- Understand the structure of matter. Have knowledge of the specifics of certain types of materials as a consequence of the dominant chemical bonds.

Course content

Theoretical part

The nature of chemical bonds. Bond energy and phase transformation parameters. Arranged systems. Principles of structural editing. Ionic crystals. Metals. Covalent and molecular crystals. Hydrogen-bonded crystals. Crystal complexes. Crystallization processes and methods. Defective conditions in crystals. Systems that deviate from periodicity. Disordered systems, structure and properties. Phase diagrams and methods of obtaining amorphous materials. Amorphous metals. Amorphous semiconductor materials. Electronic density of states in condensed systems. Dielectrics. Dielectric behaviour in a constant field. Dielectrics in an alternating electric field. Ceramics. Classics and special ceramic materials. Magnetic properties of materials. Ferromagnetism, ferrimagnetism and antiferromagnetism. Modern magnetically soft and magnetically hard materials. Physical properties of solid materials: general properties and reaction to the action of physical fields. Behaviour of materials in: mechanical field, thermal field, electric field, magnetic field and electromagnetic field. Properties of condensed matter materials and test methods. Crystal diffraction lattice. Optical measurements. Condensed matter spectroscopy. Measurement of thermal properties. Determining magnetic and dielectric characteristics.

Practical part

Crystallography, Electronic Theory, Dielectrics, Magnetics

Literature

1. D.M. Petrović, S.R. Lukić, Eksperimentalna fizika kondenzovane materije, Edicija “Univerzitetski udžbenik”, Univerzitet u Novom Sadu, Novi Sad, 2000
2. M.C. Lovell, A.J. Avery, M.W. Vernon, Physical properties of materijals, New York, 1976
3. R.M.Rose, L.A.Shepard; Struktura i osobine materijala, Univerzitet u Novom Sadu, Tehnološki fakultet, 2000
4. Ch. Kittel, Uvod u fiziku čvrstog stanja, Savremena administracija, Beograd, 1970.
5. G.Busch, H.Schade, Lectures on Solid State Physics, Pergamon Press Ltd., Oxford, 1976.

Number of active classes				Other classes:
Lectures: 3	Practical classes: 2	Other forms of teaching: 0	Students’ research work	

Teaching methods

Lectures (3 classes per week during the semester), computational exercises (2 classes per week).

Assessment (maximum 100 points)			
Course assignments	**points**	Final exam	**points**
activity during lectures	20	written exam	30
practical classes	20	oral exam	30
Total	40		60