Course Unit Descriptor

Study Programme: Physics

Course Unit Title: Introduction to Condensed Matter Physics

Course Unit Code: F18OFKM

Name of Lecturer(s): dr Svetlana Lukić Petrović

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): compulsory

Semester (winter/summer): winter

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 7

Prerequisites: Electromagentism, Optics

Course Aims:

Acquiring basic knowledge of the internal structure of materials in the field of condensed matter physics and the study of interdependence in triad "synthesis-structure-properties"

Learning Outcomes:

- Understanding the structure of ordered state, partially ordered state, nanostructure and amorphous materials.
- Knowledge of methods for obtaining materials in condensed state and application possibilities
- Knowledge of the specifics of certain types of materials as a result of dominant chemical bonds
- Understanding the basic physical properties of solid materials

Syllabus:

Theory

Getting familiar with complex problems and concepts of condensed matter physics. Ordered state – crystals. Diffraction on crystal lattice. Defects in crystals.
The nature of chemical bonds. Bond energy and parameters of phase transformations. Principles of structural ordering. Ionic crystals. Metals. Covalent and molecular crystals. Crystals with hydrogen bonding. Crystal complex.
Getting familiar with relationship between structure and material properties; effect of processing on the structure and properties.
Processes and technologies of obtaining condensed state materials.
Liquid crystals, quasi crystals, polymers and nanostructures. Disordered systems. Phase diagrams and methods of obtaining amorphous materials.

Condensed materials properties and methods of examination.

Practice

Experimental and computational exercises follow the content of lectures.

Required Reading:

1. D.M. Petrović, S.R. Lukić, *Eksperimentalna fizika kondenzovane materije*, Edicija "Univerzitetski udžbenik", Univerzitet u Novom Sadu, Novi Sad, 2000
2. Ch. Kittel, *Uvod u fiziku čvrstog stanja*, Savremena administracija, Beograd, 1970.
3. H.M.Rosenberg, *The Solid State*, Oxford University Press, 1978.
4. R.J.Elliott, A.F.Gibson, *Solid State Physics and its Applications*, Macmillan, Press Ltd., London, 1974.
5. R.M.Rose, L.A.Shepard; *Struktura i osobine materijala*, Univerzitet u Novom Sadsu, Tehnološki fakultet, 2000
6. P. Hofman, *Solid State Physics*, Wiley-VCH, New York, 2008.
7. W. D. Callister, *Materials Science and Engineering: An Introduction*, John Wiley & Sons, Inc., 2007.
8. S. H. Simon, *The Oxford Solid State Basics*, Oxford University Press, Oxford, 2013
9. J.K.Sirkin, M.E.Djatkina, *Hemijska veza i struktura molekula*, Građevinska knjiga, Beograd, 1957

10.D.Grdenić, *Molekule i kristali*, Školska knjiga, Zagreb, 1979
11.Ć.Jelačić, *Hemijska veza i struktura molekula*, Tehnička knjiga, Zagreb, 1982.
12. V.Šips, *Uvod u fiziku čvrstog stanja*, Školska knjiga, Zagreb..

Weekly Contact Hours:	**Lectures:**3	**Practical work:**2

Teaching Methods:

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	5	written exam	30
Practical work		oral exam	40
Preliminary exam(s)	15	…….	
Seminar(s)	10		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.