Level: bachelor

Course title: Introduction to Condensed Matter Physics

Status: obligatory

ECTS: 7

Requirements: Electromagentism, Optics

Learning objectives

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

Theoretical instruction

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.

Practical instruction

Experimental and computational exercises follow the content of lectures

Recomanded literature

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.

V.Šips, *Uvod u fiziku čvrstog stanja*, Školska knjiga, Zagreb..

	Lectures: 3	**Exercise and other forms of teaching: 2**