



УНИВЕРЗИТЕТ У БАЊОЈ ЛУЦИ
UNIVERSITY OF BANJA LUKA
ПРИРОДНО-МАТЕМАТИЧКИ ФАКУЛТЕТ
FACULTY OF NATURAL SCIENCES AND MATHEMATICS



CHEMISTRY DEPARTMENT

FIRST CYCLE OF STUDY

Chemistry

Course name	Solid State Chemistry			
Course code	Course status	Semester	Hours of instruction	ECTS
1C16HOSHČS	required	VIII	3+2	6
Teacher(s)	Prof. Saša Zeljković PhD			

Prerequisite course(s)	Entry requirements
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Course goals
The aim of the course is to teach students structure, forms and properties of inorganic crystalline and amorphous structures. In addition, students will learn about the methods of structural analysis and interpretation primarily through X - ray diffraction and thermal analysis, microscopy and spectroscopy.

Learning outcomes
The student is able to define the specifics of the solid state depending on the internal structure. Understand changes in physical and chemical properties that occur in compounds of nonstoichiometric composition. For the given materials know how to analyze SEM, UV-VIS, TG, DTA, DSC and XRD.

Course content
Introduction (historical perspective, material classification). Chemical bond in the solid state (ionic, covalent and metallic bonds and intermolecular interactions). Crystal systems and crystal chemistry. Crystallography and diffraction methods. Phase diagrams and phase transformations. Microscopy and spectroscopy (optical microscopy, SEM, TEM, UV-VIS, IR, Raman). Thermal properties and analyzes (heat and temperatures, heat capacity, thermal expansion, thermal conductivity, thermogravimetric analysis - TG, differential thermal analysis - DTA), differential scanning calorimetry - DSC) Experimental exercises and calculus: Fundamentals of crystallography. Stereographic crystal projections. Nanoparticle synthesis methods. Thermal methods of analysis. Analysis of phase diagrams. Use of UV-Vis spectrophotometry as one of the methods for characterization of synthesized nanoparticles.

Teaching methods
Lectures, computational and laboratory exercises

Books and other learning materials
A.R. West: Solid State Chemistry and its Applications , Wiley, New York, 2014.; W.D. Callister Jr., D.G. Rethwisch: Materials Science and Engineering: An Introduction , John Wiley & Sons, 2018.; D. Grdenić: Molecules and Crystals (in Croatian), School Book, Zagreb, 2005.; Internal practicum for laboratory and computational exercises (in Serbian).

Course activities and grading method
The colloquium and the activity refer to the exercises and are a condition for taking the final exam. Tests: two per semester. The first including the material from introduction to the phase diagrams (including phase diagrams). Others including the materials from microscopy to thermal analysis. The results of these tests are included in the final grade only if they exceed 50% of the points provided for a given form of test during the semester.

Colloquium and activity	10	Test 2	15
Test 1	15	Final exam	60

Additional course notes
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Name of the teacher who prepared this form	Saša Zeljković
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