Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Electron Devices and Microsystems		
Type and level of studies	Undergraduate Academic Studies		
The name of the course	Advanced Materials and Technologies		
Lecturer (for lectures)	Mitić V. Vojislav		
Lecturer/associate (for exercises)	Mitić V. Vojislav		
Lecturer/associate (for OFE)	Mitić V. Vojislav		
Number of ECTS	5	**Course status (obligatory/elective)**	Obligatory
Prerequisites			
Course objectives	Gaining basic knowledge on materials for modern energy components and systems. Linking theoretical knowledge and its practical application in the technological processes related to the exploration, development and production of modern materials for the energy sector. Gaining knowledge about the latest developments in the field of new materials for electronic components and systems of modern forms of energy production.		
Course outcomes	The subject seeks to develop the capacity to understand the structure-properties-application relationship and the ability to design materials with controlled properties for energy applications.		
Course outline			
Theoretical teaching	Globalization of research and development of advanced materials and technologies. Structure, symmetry and hierarchy of materials. Crystallography. Physical chemistry, thermodynamics and statistical physics of advanced electronic materials. Theory of phases and phase transitions. Processes at boundary surfaces. Influence of the microstructure on the electrical properties of ceramic materials. Fractals. Characterization of materials. Polymeric, composite and non-crystalline materials and technologies. Liquid crystals. Electrically conducting ceramics. Ceramic materials for condensers. Piezoelectric, ferroelectric and pyroelectric properties, NTCR and PTCR effects. Dielectric and magnetic materials and superconductors. Optoelectronic ceramics. Optical fibers. Ceramic materials for microwave components, quartz oscillators and filters, and MEMS components. Electronic and photonic materials. Ferrites and other ceramic materials with magnetic properties. Nanomaterials and nanotechnology. Carbonaceous materials. Materials for new and alternative sources of energy and fuel cells. Fusion materials and technology. Bioceramics. Electronic materials and technologies in space exploration. EU strategy in the field of new materials and technologies.		
Practical teaching (exercises, OFE, study and research	Laboratory and computational exercises in relevant fields		
Textbooks/references			
1	Vojislav V. Mitić, Materials for new and alternative energy sources, (in the process of issuing publishing, in Serbian)		
2	Vojislav V. Mitić, A working version of the book of lectures		
3	M. M. Ristic, Principles of Material Science, SANU Special Edition, DCXVII, (1993). (in Serbian)		
4	D.Raković, Physical basics and characteristics of electrical materials, Belgrade, (1997) (in Serbian)		
5	W.D.Callister, “Materials Science And Engineering an introduction, John Wiley&Sons Ltd, 2003		

Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	1	1	0	0
Teaching methods	Lectures, consultations, computational and laboratory exercises			

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures	10	**Written exam**	20
Exercises	20	**Oral exam**	20
Colloquia	20		
Projects	10		