Specification for the book of courses

Study program	Electronics and Microsystems		
Module	Electronics and Microsystems		
Type and level of studies	Master studies		
The name of the course	Materials for Advanced and Alternative Energy Sources		
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)**	Elective
Prerequisites			
Course objectives	Gaining academic knowledge on advanced materials for energy sources, the ability to interlink multidisciplinary knowledge. Gaining knowledge about the latest developments in advanced materials research and their application in new and alternative energy sources. Studying the structure – properties – applications and energy – materials – information relationship.		
Course outcomes	Students develop the capacity to deal with scientific, development and technological problems either alone or as members of a team, as well as to organize scientific research. They should also be able to take part in research projects owing to the experience gained through the research during studies.		
Course outline			
Theoretical teaching	Energy as a global priority issue. Materials for new and alternative energy sources. Solar energy and materials for solar cells. Electrochemical properties of materials. Electrical energy based on electrochemical processes. Batteries and micro-batteries based on ceramic materials for electronic applications. Batteries and battery systems for specific purposes (portable devices and electric or hybrid vehicles). Solid-oxide fuel cells (SOFC). Alternative energy sources (based on fluid motion: wind energy (wind generators), energy of electrical discharge in the atmosphere, water energy (mini hydropower plants), energy of underground gas sources, energy of lithosphere plate deformation (earthquakes, volcanoes) and new materials. Electronic power components and systems for the energy transformation. Microelectronic power sources for highly integrated electronic circuits and systems. Components and systems for space technology. Fusion power generation materials and mini-reactors. Electronic materials, components and systems for the management and control of climate change and earthquakes. Engineering in the design and installation of components and systems of different energy sources.Global strategy of research and development of new materials for new and alternative energy sources.		
Practical teaching (exercises, OFE, study and research	Lectures, laboratory excercises, consultations. Seminar paper. Colloquia and tests.		
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, Momčilo M. Ristić, Electrical materials, (in the process of publishing, in Serbian)		
3	Donald J. Bray, New Applications of Advanced Ceramics and the Path to Commercialization, Morgan AM&T, Daytona Beach, 2008.		
4	Steven J. Zinkle, Materials for Next Generation Nuclear Energy, Oak Ridge Nat. Laboratory, Daytona Beach, 2008.		
5	European White Book of Fundamenral Research in Materials Science Max-Planck-Institut fur Metallforschung Stuttgart Publishers: Max-Planck-Institut fur Metallforschung Stuttgart M.Ruble, H.Dosch, E.J.Mitemeijer, M.H.van de Voorde, 2001.		
Number of classes of active education per week during semester/trimester/year			

Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1		
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		