Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Common		
Type and level of studies	Doctoral studies		
The name of the course	Technology, Design and Characterization of Microsystems		
Lecturer (for lectures)	Prijić D. Zoran		
Lecturer/associate (for exercises)			
Lecturer/associate (for OFE)			
Number of ECTS	10	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	The objectives of the course are such that a PhD student will: - Know the materials used in the production of microsystems; - Know the technological processes used for production; - Understand the process of designing and characterizing microsystems.		
Course outcomes	Learning specific learning outcomes are defined so that a PhD student will: - Distinguish materials used in the production of microsystems; - Distinguish, at the level of detail, technological processes and their order in the production of microsystems; - Explain, at the level of detail, the process of designing and characterizing microsystems; - Design the microsystem, according to the given functional and technical specifications.		
Course outline			
Theoretical teaching	Basic terms. Materials for microsystems - Materials in silicon technologies: monocrystalline silicon, polycrystalline silicon, silicon dioxide, silicon nitride, metal films, polymers. Materials in other technologies: silicon carbide, diamond, gallium arsenide and other III / V semiconductor compounds, piezoelectric ceramics. Material properties and physical effects. Technological processes in the production of microsystems - Standard technological processes: lithographic processes, thin layer deposition processes: CVD processes, PVD processes, Wet and dry etching. Other technological processes: anodic bonding, sol-gel deposition, electrolytic deposition. Technologies of Micro Machines. Surface micromachining, volume micromachining, LIGA, DXRL and EFAB technologies, assembling and integrating microsystems into enclosures. Flow diagram of microsystem design. Characterization of components and subsystems. Integration of analog and digital components of the microsystem. Microsystem power supply. Performance optimization.		
Practical teaching (exercises, OFE, study and research	Study research work in the field of materials, technological processes, design or characterization of microsystems, according to student affinity.		
Textbooks/references			
1	"MEMS: Fundamental Technology and Applications (Devices, Circuits, and Systems)", Ed. by V. Choudharu and K. Iniewski, CRC Press, 2013.		
2	Selected scientific papers (reviews)		
3	N. Maluf and K. Williams, "An Introduction to Microelectromechanical Systems Engineering", 2nd Ed., Artech House, 2004.		
4			
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Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
3	0	0	0	0
Teaching methods	Lectures; Consultations. Active participation in scientific and research projects.			

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures		**Written exam**	
Exercises		**Oral exam**	50
Colloquia			
Projects	50		