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	Semiconductor Devices and Technologies		
Lecturer (for lectures)	Prijić P. Aneta		
Lecturer/associate (for exercises)			
Lecturer/associate (for OFE)			
Number of ECTS	10	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	Objectives of the course are focused on: - Detailed analysis of physical processes in semiconductor materials; - In-depth study of the structure and principles of the basic semiconductor devices functioning; - Introduction to the structures and functioning principle of semiconductor devices based on heterojunctions and compound semiconductors; - Understanding the functioning of microwave and photovoltaic components; - Introduction to advanced technologies for semiconductor devices and integrated circuits fabrication.		
Course outcomes	Learning outcomes allow a student to: - Visualize the effects of high doping of the semiconductors through the concept of energy bands; - Explain the interdependence of relations that describe the concentrations and transport of charge carriers in the semiconductor; - Analyze secondary physical and electrical effects that affect the functioning of basic semiconductor devices; - Compare the functioning principles of semiconductor devices based on heterojunctions and semiconductor compounds with basic semiconductor devices; - Explain the functioning of microwave and photovoltaic devices; - Specifies the unique properties of advanced semiconductor devices fabrication techniques.		
Course outline			
Theoretical teaching	Energy bands and carrier concentrations in equilibrium. Effects of a highly doped semiconductor. Transport of charge carriers. Diodes. Silicon bipolar transistors. Bipolar transistors based on heterojunctions. Modeling of bipolar transistors. Field effect transistors based on semiconductor compounds. GaAs MESFETs. Heterojunction Field Effect Transistors (HFETs). MOSFET transistors. CMOS/BiCMOS. SOI and 3D structures. Microwave components. Photovoltaic components. Monocrystalline silicon formation and epitaxial growth. Oxidation and growth of thin films. Diffusion and ion implantation. Photolithography and etching. Integrated devices.		
Practical teaching (exercises, OFE, study and research			
Textbooks/references			
1	S. Zee, M. Lee, "Semiconductor Devices - Physics and Technology", 3rd Edition, Wiley, 2012 - selected chapters.		
2	D. Neaman, "Semiconductor Physics and Devices", 4th Edition, McGrawHill, 2011 - selected chapters.		
3			
4			
5			

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	Consulting teaching; Participation in the realization of scientific-research projects; Inclusion in the teaching process at bachelor and master academic studies; Seminars and projects.			

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures		**Written exam**	
Exercises	30	**Oral exam**	40
Colloquia			
Projects	30		