

## Specification for the book of courses

<b>Study program</b>		Electrical Engineering and Computer Science		
<b>Module</b>		Common		
<b>Type and level of studies</b>		Doctoral studies		
<b>The name of the course</b>		Microwave Electronics		
<b>Lecturer (for lectures)</b>		Pronić-Rančić R. Olivera, Maleš-Ilić P. Nataša		
<b>Lecturer/associate (for exercises)</b>				
<b>Lecturer/associate (for OFE)</b>				
<b>Number of ECTS</b>	10	<b>Course status (obligatory/elective)</b>	Elective	
<b>Prerequisites</b>				
<b>Course objectives</b>	Introduction to the advanced techniques of design and optimization of linear and nonlinear microwave circuits.			
<b>Course outcomes</b>	Understanding the principles of operation and ability to design microwave electronic circuits.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Modern CAD techniques - modeling, simulation and optimization of microwave circuits. Microwave semiconductor devices: microwave diodes and transistors. Applications of microwave semiconductor devices. RF and microwave amplifiers. Small signal amplifiers and nonlinear amplifiers. Low-noise amplifiers. Broadband amplifiers. Power amplifiers - basic features and applications. Classes of power amplifiers. Harmonic balance analysis. RF and microwave oscillators. Mixers. Detectors. Modulators. Microwave control circuits (switches, phase shifters, limiters, attenuators). Microwave integrated circuits.			
<b>Practical teaching (exercises, OFE, study and research)</b>	Solving selected problems in the form of seminar papers. Analysis and optimization of microwave circuits and components using specialized software packages.			
<b>Textbooks/references</b>				
1	I.A. Glover, S.R. Pennock, P.R. Shepherd, Microwave devices, circuits and subsystems for communications engineering, John Wiley & Sons Inc.,2005.			
2	R. Gilmore and L. Besser, Practical RF Circuit Design for Modern Wireless Systems, Volume II: Active Circuits and Systems, Norwood: Artech House, 2003.			
3	D. Pozar, "Microwave Engineering - third edition", John Wiley & Sons, Inc., 2005.			
4	I. Bahl, P. Bartia, "Microwave Solid State Circuit Design", John Wiley & Sons, Inc., 2003.			
5	O. Pronić, V. Marković, N. Maleš – Ilić, B. Milovanović: "Microwave electronics (in Serbian)", Faculty of electronic engineering, Niš, 2013.			
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
3	0	0	0	0
<b>Teaching methods</b>	Lectures. Seminar papers. Consultations.			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>		<b>Points</b>	<b>Final exam</b>	<b>Points</b>
<b>Activity during lectures</b>			<b>Written exam</b>	
<b>Exercises</b>			<b>Oral exam</b>	50
<b>Colloquia</b>				
<b>Projects</b>		50		