

## 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>		Antennas and Propagation		
<b>Lecturer (for lectures)</b>		Dončov S. Nebojša, Stanković Ž. Zoran		
<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>		The acquisition of high-level theoretical and practical knowledge of radiation and reception of electromagnetic waves using antennas and antenna systems and electromagnetic waves propagation over the surface of the Earth.		
<b>Course outcomes</b>		Independently solving practical problems in the area of the design of antennas and antenna systems. Independently solving practical problems in the area of electromagnetic wave propagation modeling in real conditions over the surface of the Earth.		
<b>Course outline</b>				
<b>Theoretical teaching</b>		Analysis of antennas and antenna arrays (analytical and numerical methods). Synthesis of antennas and antenna arrays. Software tools for analysis and synthesis of antenna, antenna arrays and antenna systems. The design procedures for different classes of antennas that have practical applications in modern wireless communication systems. Adaptive antenna structure. Advanced techniques in DOA estimation. Electromagnetic wave propagation modeling. Electromagnetic field prediction in different local-specific regions for different services. Neural models for electromagnetic field prediction. Numerical, empirical, neural and hybrid methods in electromagnetic wave propagation modeling. Implementation of local-specific neural and hybrid empirical-neural (HEN) models with increased efficiency of prediction .		
<b>Practical teaching (exercises, OFE, study and research)</b>		Independent research work (literature reading, analysis of particular problem and realization of its solution).		
<b>Textbooks/references</b>				
1	M. Dragović, Antennas and propagation, 4th edition (in Serbian), Academic mind, Belgrade, 2008.			
2	C. Balanis, Antenna theory: Analysis and Design, 4rd edition, Wiley, 2016.			
3	J. Kraus, Antennas, Mc Graw Hill, 1988.			
4	W. Stutzman, G. Thiele, Antenna Theory and Design, 3rd Edition, Wiley, 2012.			
5	B. Allen, M. Ghavami, Adaptive Array Systems: fundamentals and applications, Wiley, 2005.			
<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>		Presentations for specific topics. Seminar papers and projects.		
<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		