

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - System Engineering and Radio-Communications		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Antennas and Propagation		
Lecturer (for lectures)		Stanković Ž. Zoran, Dončov S. Nebojša		
Lecturer/associate (for exercises)		Dimitrijević Ž. Tijana		
Lecturer/associate (for OFE)		Dimitrijević Ž. Tijana		
Number of ECTS	6	Course status (obligatory/elective)	Obligatory	
Prerequisites				
Course objectives	The acquisition of theoretical and practical knowledge of radiation and reception of EM waves using antennas and EM waves propagation radiated by antennas.			
Course outcomes	Understanding the EM nature and working method of the antenna in the transmitting and receiving mode. Knowledge of different types of antennas that are used in telecommunications. Ability to apply the antenna design and measurements procedures. Knowledge of nature of EM wave propagation and how the waves propagate over the earth's surface.			
Course outline				
Theoretical teaching	Classification of antennas. Wire antennas. Horn antennas. Reflector antennas. Lens antennas. Printed antennas. Broadband antennas. Frequency independent antennas. Antenna arrays. Adaptive antenna systems. Methods of antenna analysis and antenna synthesis. Software tools for the design of antennas and scattering objects. Antenna measurements. Examples of practical antennas in fixed and mobile wireless communications systems. The influence of antenna parameters and the environment on the trajectory of EM waves. Ground waves. Methods for the prediction of electric field level of the ground waves. Spatial waves. Diffraction effects. Methods for the prediction of electric field including diffraction effects. Propagation models in specific regions. Propagation of radio waves through the ionosphere. Calculation of wave trajectory parameters in the ionosphere.			
Practical teaching (exercises, OFE, study and research)	Auditory exercises: Practical problem solving in the field of antennas analysis, antennas synthesis and EM wave propagation analysis. Laboratory exercises: Antenna measurements, practical work with software tools for the antenna design and software tools for the EM wave propagation analysis.			
Textbooks/references				
1	M. R. Dragović, Antennas and Propagation (in Serbian), Akademski misao, 2008.			
2	C. Balanis, Antenna theory: Analysis and Design, 4rd edition, Wiley, 2016.			
3	W. Stutzman, G. Thiele, Antenna Theory and Design, 3rd Edition, Wiley, 2012.			
4	J. Kraus, Antennas, Mc Graw Hill, 1988.			
5	J. S. Seybold, Introduction to RF Propagation, Wiley, 2005.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	2	1	0	0
Teaching methods	Lectures, auditory exercises, practical work in a laboratory, homeworks, consultations.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures	5	Written exam	20	
Exercises	15	Oral exam	20	
Colloquia	40			
Projects				