

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		RF and Microwave Radiation Safety		
Lecturer (for lectures)		Marković V. Vera, Marinković D. Zlatica		
Lecturer/associate (for exercises)		Dimitrijević Ž. Tijana		
Lecturer/associate (for OFE)		Joković J. Jugoslav		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
Getting to know the types and sources of RF and microwave radiation in living and working environment and health risks related to this kind of radiation. Getting acquainted with legal regulations in order to protect against the negative effects of these radiation. Introduction to methods for measuring the level of the electromagnetic field.				
Course outcomes				
The student understands the interaction between electromagnetic (EM) fields and tissues and the effects that occur; is able to independently identify the types and sources of RF and microwave radiation that have a harmful effect on living organisms; knows the regulations in the field of protection against electromagnetic radiation; can carry out risk assessment based on data obtained by measurement or in some other way; is able to take appropriate safety measures.				
Course outline				
Theoretical teaching				
Sources of EM radiation on medium and high frequencies. Exposure of the population with the expansion of wireless communication systems. Interaction of RF/microwave radiation and biological systems. Electromagnetic properties of biological tissues and penetration of EM fields into organisms. SAR and its calculation. Biological effects of RF and microwave radiation. Regulatory aspects and public safety. Standards and valid legal regulations in the Republic of Serbia. The role of regulatory bodies and agencies. Legislation in Europe and world and recommendations of the World Health Organization. Measuring methods for the control of RF and microwave radiation.				
Practical teaching (exercises, OFE, study and research)				
Calculations related to the penetration of electromagnetic fields into living organisms and the absorption of electromagnetic energy. Introduction to instruments and methods for experimental determination of RF and microwave radiation levels. Introduction to methods for continuous monitoring of the level of EM fields in the environment.				
Textbooks/references				
1	"Rulebook on limits for exposure to non-ionizing radiation" (in Serbian), Službeni glasnik RS 104/09, br.110-00-58/2009-05.			
2	„Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (ICNIRP guidelines)”, Health Physics, Vol. 74, Number 4, 1998			
3	V. Marković, D. Krstić, "Standardi za izloženost RF zračenju u uslovima ekspanzije bežičnih komunikacionih sistema", XXIII simpozijum o novim tehnologijama u poštanskom i telekomunikacionom sabračaju, Beograd, 2005, str. 229-240.			
4	„Ispitivanja EM polja – emf RATEL“, emf.ratel.rs/lat/ispitivanja-em-polja/			
5	C95.3-2002 - IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100kHz-300GHz, http://standards.ieee.org/findstds/standard/C95.3-2002.html .			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	1	0	0
Teaching methods				
Lectures, exercises, consultations. Preparation of seminar works.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	
Activity during lectures		5	Written exam	
Exercises		15	Oral exam	
Colloquia				
Projects		30		