

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Applied Electromagnetics		
Lecturer (for lectures)		Raičević B. Nebojša, Perić T. Mirjana		
Lecturer/associate (for exercises)		Živaljević U. Dragana		
Lecturer/associate (for OFE)		Perić T. Mirjana		
Number of ECTS		6	Course status (obligatory/elective)	Elective
Prerequisites		Not		
Course objectives		The aim of the subject is that the student upgrades her knowledge of electrostatics and magnetism, learns to apply the most commonly used analytical and numerical methods for calculation of EM fields, as well as to get familiar with existing software packages for solving practical problems in the field of electromagnetics.		
Course outcomes		Students who successfully adopt the course material will be capable of following other specialized courses. The student is trained to solve elementary engineering problems that require knowledge of electromagnetics. Also, the candidate is able to understand working principles of devices based on electromagnetic field properties, which are of great significance in modern communication technologies. The candidate is able to predict the electromagnetic field in the surroundings of devices, as well as to improve its performance, increase its compatibility with other devices, and ensure its safe usage.		
Course outline				
Theoretical teaching		Integral and differential form of Maxwell's equations. Maxwell's equations in the complex domain. Electromagnetic properties of materials. Boundary conditions. Electrostatics. Stationary and time-varying electromagnetic field. Analytical methods for calculation of the electromagnetic fields - method of separation of variables, application of the complex variable functions (conformal mapping). Numerical methods for calculation of electromagnetic fields - finite different method, finite element method (FEM), finite difference time domain method (FDTD), equivalent electrodes method (EEM). Electromagnetic field potentials in the homogenous media. Poynting's theorem. Plane-wave propagation (in vacuum, dielectrics, imperfect conductors, ferrites and layered media). Wave polarization. Propagation of electromagnetic fields. Fresnel's coefficients. TEM, TE and TM guided waves. Electromagnetic radiation and antennas.		
Practical teaching (exercises, OFE, study and research work)		Integral and differential form of Maxwell's equations. Maxwell's equations in the complex domain. Electromagnetic properties of materials. Boundary conditions. Electrostatics. Stationary and time-varying electromagnetic field. Analytical methods for calculation of the electromagnetic fields - method of separation of variables, application of the complex variable functions (conformal mapping). Numerical methods for calculation of electromagnetic fields - finite different method, finite element method (FEM), finite difference time domain method (FDTD), equivalent electrodes method (EEM). Electromagnetic field potentials in the homogenous media. Poynting's theorem. Plane-wave propagation (in vacuum, dielectrics, imperfect conductors, ferrites and layered media). Wave polarization. Propagation of electromagnetic fields. Fresnel's coefficients. TEM, TE and TM guided waves. Electromagnetic radiation and antennas.		
Textbooks/references				
1	F. T. Ulaby, E. Michielssen, U. Ravaioli: Fundamentals of Applied Electromagnetics (6/E), Prentice Hall, 2010.			
2	D. M. Veličković et al., Collection of solved examples from Electromagnetics - I part (in Serbian), Faculty of Electronic Engineering of Niš, Niš, 2000.			
3	D. M. Veličković, F. H. Uhlmann, K. Brandisky, R. D. Stancheva, H. Brauer: Fundamentals of Modern Electromagnetics for Engineering, TU Ilmenau, Germany, 2005.			
4	J. V. Surutka: Electromagnetics (in Serbian), Građevinska knjiga, Beograd, 1966.			
5	D. M. Veličković: Electromagnetics (in Serbian) - the first book, Faculty of Electronic Engineering, Niš, 2004.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1	0	0
Teaching methods		Lectures and auditive practice classes. Besides board work, multimedial presentations, photographs and video clips are presented. Obligatory consultations with lecturers help successful course material adoption.		
Grade (maximum number of points 100)				

Pre-exam duties	Points	Final exam	Points
Activity during lectures	20	Written exam	20
Exercises		Oral exam	20
Colloquia	40		
Projects			