Specification for the book of courses

Study program	Communications and Information Technologies		
Module	System Engineering and Radio-Communications		
Type and level of studies	Master studies		
The name of the course	Wireless and efficient energy transfer		
Lecturer (for lectures)	Dončov S. Nebojša, Maleš-Ilić P. Nataša		
Lecturer/associate (for exercises)			
Lecturer/associate (for OFE)	Stošić P. Biljana		
Number of ECTS	4	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	Acquisition of basic knowledge of techniques for wireless and efficient energy transfer. Introduction to systems for a wireless energy transfer in the near- and far-field of radiation and systems for an efficient use of microwave radiation.		
Course outcomes	Knowledge of the main characteristics of systems for wireless and efficient energy transfer. Ability to design basic systems for wireless power transfer and fundamental microwave rectifiers.		
Course outline			
Theoretical teaching	Propagation of electromagnetic waves in the near- and far-field of radiation. Systems for propagation of electromagnetic waves in the near-field of radiation (inductive coupling, coupling based on magnetic resonance). Wireless energy transfer in the far-field of radiation. Systems for an efficient use of microwave radiation energy. Use of Schottky diode in rectifiers. Voltage doubler and multipliers. Microwave rectifier circuits. Microwave rectenna devices used for wireless and efficient transfer of microwave radiation. Data transfer and efficient use of microwave radiation by using six-port receiver. Applications of systems for wireless and efficient energy transfer.		
Practical teaching (exercises, OFE, study and research	Modeling of the Schottky diode used in rectifiers circuits. Design and analyzes of voltage doubler and microwave rectenna device. Design of fundamental systems for wireless power transfer and fundamental microwave rectifiers.		
Textbooks/references			
1	H. Sun, Far-Field Wireless Power Transmission and Ambient RF Energy Harvesting Concepts, Designs, Applications, Scholars' Press, 2015		
2	Eugen Coca, Wireless Power Transfer - Fundamentals and Technologies, InTech, 2016.		
3	Alicia Triviño-Cabrera and José A. Aguado, Emerging Capabilities and Applications of Wireless Power Transfer, IGIGloba, 2019.		
4	Naoki Shinohara, Wireless Power Transfer: Theory, technology, and applications, Institution of Engineering and Technology, 2018.		
5	N. Bizon at al, Energy Harvesting and Energy Efficiency-Technology, Methods, and Applications, Springer, 2017.		

Number of classes of active education per week during semester/trimester/year

Lectures	Exercises	OFE	Study and research work	Other classes
2	0	1	0	0
Teaching methods	Lectures, practical work, consultations, seminar/team project.			

Grade (maximum number of points 100)

Pre-exam duties	Points	Final exam	Points
Activity during lectures	5	**Written exam**	
Exercises	30	**Oral exam**	30
Colloquia			
Projects	35		