

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Common		
Type and level of studies		Doctoral studies		
The name of the course		Applications of Neural Networks in Telecommunications		
Lecturer (for lectures)		Marković V. Vera, Marinković D. Zlatica, Stanković Ž. Zoran		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Acquiring the necessary knowledge needed for independent application of artificial neural networks in the field of telecommunications.			
Course outcomes	Knowledge about basic principles of neural networks. Ability to train and test neural networks and to develop models based on neural networks. Ability to apply independently the neural networks to develop solutions for particular problems in the field of telecommunications			
Course outline				
Theoretical teaching	Neuron and biological nervous system. Artificial neural networks (ANNs). Types of ANNs. Multilayer neural networks. Recurrent neural networks. Training and testing of ANNs. Models based on neural networks. Black-box neural models. Knowledge-based neural models. Hybrid empirical-neural models. Analysis of various examples of ANN applications in the field of telecommunications. Software packages to be used for work with ANNs. Implementing neural models in specialized CAD software packages for use in telecommunications.			
Practical teaching (exercises, OFE, study and research)	Independent research work (analysis of the available literature, analysis of a particular problem and finding solutions, writing and presentations of scientific work)			
Textbooks/references				
1	S. Haykin, Neural networks, New York, IEEE, 1994.			
2	Q. J. Zhang, K. C. Gupta, Neural Networks for RF and Microwave Design, Artech House, 2000.			
3	C. Christodoulou, M. Gerogiopoulos, Applications of Neural Networks in Electromagnetics, Artech House, 2001.			
4	Z. Marinković, V. Marković, A. Caddemi, "Artificial Neural Networks in Small-Signal and Noise Modeling of Microwave Transistors", Chapter 6 in „Artificial Neural Networks“ edited by Seoyun J. Kwon, Nova Science Publishers Inc., 2011, pp. 219-236			
5	Selected scientific publications			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	0	0	0	0
Teaching methods	Lectures; independent research work; consultations. (Note: publishing a scientific paper in a journal or a presentation at a conference replaces the oral part of the exam.)			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures		Written exam		
Exercises		Oral exam		50
Colloquia				
Projects	50			