

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		Artificial Intelligence in Engineering		
Lecturer (for lectures)		Andrejević-Stošović V. Miona		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
Acquiring knowledge in the field of artificial intelligence with special attention to artificial neural networks concept. Training for independent use of these concepts to solve problems in electrical engineering.				
Course outcomes				
Acquiring competence in applying of artificial neural networks in design, testing and diagnosis of electronic circuits and systems. Students are expected to learn fundamental algorithms for neural networks training, as well as handling software for neural networks utilization.				
Course outline				
Theoretical teaching				
Artificial intelligence concept. Artificial intelligence based on production rules. Artificial neural networks. Natural nervous system. Neuron. Synapse. Neuron model. Artificial neural networks architectures. Training. Perceptron. Possibilities and algorithms for perceptron training. Multi-layer neural networks. Recurrent neural networks. Types, training and application problems. Procedures of dynamic training. Genetic algorithms. Artificial neural networks realization. VLSI implementation of analog neural networks. Digital realization. Boltzmann machine. Neuro-fuzzy networks and their application.				
Practical teaching (exercises, OFE, study and research)				
Specialized ICs that implement neural networks. The application of neural networks in CAD, image and signal processing, in OCR systems, in speech recognition, in robotics, in civil and military security systems. The hardware implementation of artificial neural networks on FPGAs.				
Textbooks/references				
1	Genetic Algorithms in Applications, Editor Rustem Popa, In-tech, March 2012, ISBN 978-953-51-0400-1.			
2	Andrejević, M., „Neuronske mreže u modelovanju“, Zadužbina Andrejević, Beograd, 2004.			
3	Milenković, S., „Veštačke neuronske mreže“, Zadužbina Andrejević, Beograd, 1997.			
4	Haykin, S., „Neural Networks: A Comprehensive Foundation“, Macmillan College Publishing Company, Inc., 1994.			
5				
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, laboratory practice, individual projects.				
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		