

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Communications and Information Technologies - Communications and Information Processing		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Artificial Intelligence for Signal Processing		
Lecturer (for lectures)		Perić H. Zoran, Jovanović Ž. Aleksandra, Nikolić R. Jelena		
Lecturer/associate (for exercises)		Jovanović Ž. Aleksandra, Nikolić R. Jelena		
Lecturer/associate (for OFE)		Jovanović Ž. Aleksandra, Nikolić R. Jelena		
Number of ECTS	6	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
Providing fundamental knowledge about artificial intelligence methods and algorithms. Considering the possible applications of artificial intelligence with a special emphasis on applications in signal processing in modern communications and engineering.				
Course outcomes				
Theoretical knowledge and skills necessary for the application of methods and algorithms of artificial intelligence in signal processing, speech recognition and speaker recognition, image classification, signal parameter estimation and signal prediction.				
Course outline				
Theoretical teaching				
The concept of artificial intelligence (uniform and heuristic search algorithms). Machine learning, neural networks. Modeling and presentation of knowledge. Rule-based conclusion. Automatic conclusion on the basis of resolution. Architectures of neural networks and training algorithms. Genetic algorithm. Evolution algorithm. Ensemble algorithm (rules of combination). Unsupervised learning. Supervised learning SVM, SVR. Fast learning. Convolutional neural networks. Neural networks for speech recognition and speaker recognition. Application of neural networks in signal processing. Application of neural networks and statistical methods in classification. Application of learning methods in estimating signal parameters. Application of neural networks in signal prediction.				
Practical teaching (exercises, OFE, study and research)				
In practical and laboratory exercises theoretical and practical knowledge is acquired by solving tasks and some practical problems in artificial intelligence and students have the opportunity to understand the importance of applying artificial intelligence algorithms.				
Textbooks/references				
1	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning: with Applications in R, Springer 2014.			
2	P. Norvig, S. Russell, Veštačka inteligencija – Savremeni pristup, CET, 2011.			
3	I. H. Witten, E. Frank, M. Hall, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann Series in Data Management Systems, 2016.			
4	I. Goodfellow, Y. Bengio, A. Courville, Deep Learning, MIT Press, 2016.			
5	C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2007.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	1	1	0	0
Teaching methods				
Lectures, Power Point presentations, practical exercises, practical training on computers, consultations.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	20
Exercises		20	Oral exam	20
Colloquia				
Projects		35		