Study programme(s): Applied Mathematics (MAP)		
Course title: ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS (P605)		
Lecturer(s): Milica Žigić		
Course status: compulsory on module: Data Analytics and Statistics		
ECTS points: 6		
Requirements: Probability		
Learning Objectives - Understanding various methods of artificial intelligence and machine learning. - Understanding the pros and cons of different methods. - Ability to choose the appropriate method, as well as the type and parameters of the neural network for a particular problem. - Ability to implement in the relevant software package		
Learning Outcomes The student acquires experience and the ability to apply learned methods to various real problems. Understanding and operational knowledge of work, training, and parameters of different types of neural networks.		
Syllabus *Theoretical instructions* Reasoning and expert systems (*goal trees and rule-based expert systems*), search methods in artificial intelligence systems (*depth-first, hill climbing, beam*), probabilistic reasoning, neural networks, perceptron, feed-forward neural networks, convolutional neural networks, recursive and recurrent neural networks, deep neural networks, backpropagation, dropout, support vector machines, logistic regression, advanced dimensionality reduction methods, nonlinear maps. *Practical instructions* Implementation of artificial intelligence, machine learning and neural networks algorithms, as well as the use of software packages for machine learning and neural networks.		

Literature
 	
  1. Li Deng and Dong Yu, **Deep Learning: Methods and Applications,** Now Publishers Inc, 2014.
  2. Michael Nielsen, **Neural Networks and Deep Learning,** available at
     http://neuralnetworksanddeeplearning.com
  3. C. Bishop: **Pattern recognition and machine learning**, Springer, 2006
  4. T. Hastie, R. Tibshirani and J. Friedman: **Elements of Statistical Learning**. Springer, 2009		

Number of active classes	**Lectures: 2**	**Exercises: 3**
Teaching methods Lectures; repetition; active participation of students in problem solving. Knowledge tests, homework. Applications to concrete problems with real data.		
Grading (maximum number of points 100)		

Pre-exam obligations	Points	Final exam	Points
Homework and mini project	**30**	Final exam	**70**