Course: Introduction to Machine Learning

Course instructors: Lazar Velimirović

Course type: elective

Credit points ECTS: 12

Prerequisites:

Course objectives:

Broader introduction to the principles, algorithms and basics of machine learning from the angle of modeling and prediction. The main topics include linear and nonlinear models for supervised and unsupervised learning.

Learning outcomes:

The student will be familiar with the broader basics, principles and algorithms of machine learning. The student will be able to recognize, model and implement different machine learning algorithms, as well as to evaluate the performance of different models.

Course description (outline):

- Linear Regression, parameter estimation, predictions and models, non-linear regression
- Logistic Regression, maximum likelihood, classification
- Penalty regression, LASSO, Ridge, regularization
- Generative models, Naïve Bayes, conditional probabilities
- Divide and conquer, decision trees, random forests, nearest neighbors
- Representational/factor models, PCA, SVD, matrix factorization
- Perceptron, support vector machine, constrained optimization, kernels
- Neural networks, Convolution neural networks

References:

- 8. Mohri, M., Rostamizadeh, A., & Talwalkar, A. (2018). Foundations of machine learning. MIT press.
- 9. Shalev-Shwartz, S., & Ben-David, S. (2014). Understanding machine learning: From theory to algorithms. Cambridge university press.

Active teaching hours: 5	Theoretical classes: 5	Practice classes:

Methods of teaching:

Classical teaching methods with video projectors and interaction with students. Students' knowledge is tested through homework and defense of seminar papers. The final oral exam checks the comprehensive understanding of the presented material.

Grading structure (100 points)

Pre-exam obligations:

• activity during classes 10 points,

• seminar paper or oral seminar 20 points,

Oral exam 70 points