ERASMUS+
EU programme for education, training, youth and sport

Incoming student mobility

Name of UNIOS University Unit: SCHOOL OF APPLIED MATHEMATICS AND INFORMATICS

COURSES OFFERED IN FOREIGN LANGUAGE
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	School of Applied Mathematics and Informatics

Study program	• Undergraduate university study programme in Mathematics and Computer Science • Undergraduate university study programme in Mathematics

Study level	Undergraduate (Bachelor)

Course title	Machine Learning
Course code	M096
Language of instruction	English
Brief course description	Syllabus. Supervised Learning: 1. Introduction to the theory of machine learning. 2. Techniques of nonparametric learning. K-nearest neighbour method. Decision three. 3. Bayesian learning. Bayesian naive and optimal classifier. 4. Neural network: representation and learning. 5. Regression and classification. Linear regression. Locally weighted linear regression. Logistical regression and classification. Regularization. 6. Support Vector Machine (SVM): Hyperplane separation. Optimal marginal classification. Dual problem. Kernel method. Sequential minimal optimization. 7. Theory of statistical learning. Vapnik-Chervonenkis dimension. Unsupervised Learning: 1. Introduction and motivation. Definitions. Different examples of applications Representative of the finite set from R in least squares (LS) sense and in least absolute deviations (LAD) sense. Representative of the finite set from R^2. Distance-like function in R^2. Centroid, median and geometrics median in plane. Representative of the

	finite set from R^n: centroid, median, geometrics median. Applications of Mahalanobis distance-like function. Representative of the data on unit circle. 2. Data clustering methods. K-means algorithm. EM (Expectation Maximization) algorithm. K-medoid method. Agglomerative clustering 3. Dimension reduction. Principal Component Analysis. 4. Appropriate number of clusters in a partition: Indexes. 5. Spectral clustering methods and theory of graphs. 6. Probabilistic and statistical aspects of data clustering
Form of teaching	Consultative teaching.
Form of assessment	Lectures and exercises are illustrated by ready-made software packages. Exercises are partially auditory and partially laboratory, with the use of computers. Lectures, exercises and seminars are obligatory. Final exam consists of a written and oral part, and it is taken after the completion of lectures. Acceptable results achieved in mid-term exams throughout the semester replace the written part of the exam. Students may influence their final grade by doing homework or writing a seminar paper during the semester. Homework expands course contents, and students are expected to be independent and creative. Seminar papers are understood as an extension of homework.
Number of ECTS	7
Class hours per week	3+2+0
Minimum number of students	
Period of realization	Summer semester
Lecturer	Kristian Sabo Domagoj Matijević