Course Unit Descriptor

Study Programme: Biomedical engineering

Course Unit Title: Machine learning 1

Course Unit Code: EK466

Name of Lecturer(s): Lončar-Turukalo Tatjana, Sečujski Milan

Type and Level of Studies: Bachelor

Course Status (compulsory/elective): compulsory

Semester (winter/ summer): winter

Language of instruction: english

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 6

Prerequisites: none

Course Aims:.

Introduction to basic machine learning concepts and algorithms including theoretical foundations, analysis and practical applications. The course provides understanding of the relevant supervised and unsupervised learning approaches and offers best practices and operational advises on their implementation.

Learning Outcomes:
Students will be able to identify and exemplify machine learning problems. They will be able to interpret and analyze machine learning algorithms, implement them (in Python), and evaluate algorithms' performance. Students will know how to combine the algorithms and compose workflows from data preprocessing to performance validation step. Gaining experience on how to overcome common implementation problems (accuracy, computational cost, overfitting, regularization).

Syllabus.
Introduction and basic concepts. Machine learning system's components. Learning types. Approaches to ML. Different machine learning problems. Fundamental concepts: cost-functions, overfitting, regularization, cross-validation, bias-variance trade-off, curse of dimensionality. Supervised learning (Bayesian decision theory; quadratic classifiers; density estimation: parametric (Maximum Likelihood and Bayesian estimation) and non-parametric (kernel density estimation, kNN); linear and logistic regression; linear discriminative functions; neural networks; support vector machines) Unsupervised learning (k-Means Clustering; Hierarchical clustering) Dimensionality reduction: PCA , LDA.

Required Reading:

Weekly Contact Hours: 2	**Lectures: 3**	**Practical work: 0**

Teaching Methods:
Lectures, computer lab sessions (Python and other appropriate programming envionments), homework, consultations, active learning, project and research based learning, workshops.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Attendance			
Computer exercises			
Tests (4x)			