Course Unit Descriptor

Study Programme: Computing And Control Engineering
Course Unit Title: Self-Learning and Adaptive Algorithms
Course Unit Code: AUN54
Name of Lecturer(s): Rapaić Milan, Kapetina Mirna
Type and Level of Studies: bachelor
Course Status (compulsory/elective): elective
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: 4
Prerequisites: none
Course Aims:. Prepares students for solving basic problems in analysis, synthesis and implementation of self-learning and adaptive systems in decision support problems and elsewhere. Introduces them to appropriate literature and prepares them for individual work in the field.
Learning Outcomes: The students will acquire basic knowledge in the field of self-learning and adaptive systems and algorithms. They will be trained to select the appropriate algorithms, select meta-parameters, and implement it on appropriate platform.
Syllabus. 1. Basic notions on decision support systems, machine learning, adaptive and self-learning systems. 2. Finite Markov decision processes. 3. Basic methods of exactly solving finite decision problems. 4. Limitations of exact methods and necessity for introducing approximations - examples and case studies. 5. Linear regression and classification - Least squares. 6. Adaptive parameter estimation - Recursive least squares and Kalman filter. 7. Non-linear regression and classification. Adaptive estimation of parameters in non-linear models. 8. Artificial neural networks (ANN) as an example of non-linear regression and classification. Backpropagation algorithm. 9. Stochastic gradients and steepest descent for ANN training. 10. Adaptive estimation of parameters in linear models. 8. Linear predictors and adaptive linear predictors.
Required Reading: Relevant literature in English, tbd

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

Teaching Methods: Lectures. Computer-based exercises. Consults. Projects.
Knowledge Assessment (maximum of 100 points):

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