Course Unit Descriptor

Study Programme: Computing And Control Engineering

Course Unit Title: Methods of Optimization

Course Unit Code: E237

Name of Lecturer(s): Jeličić Zoran, 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: 8

Prerequisites: none

Course Aims:.

Students learn about theoretical and practical bases of non-linear optimization of static and dynamic systems.

Learning Outcomes:
Students will lear to recognize, formulate and solve optimization problems, i.e. tasks involving identification of the best admissible solution of a given problem. Optimization problems are ubiquotious in engineering. Having in mind the existence of broad plaethora of optimization methods, the students will learn how to recognize the one best suited for the problem at hand, as well as how to implement the chosen method in the concrete situation.

Syllabus.
Formulation of optimization problem. Theoretical bases of static optimization. Analytical system determination, functions of one or more variables without constraints. Analytical determination of extremes, functions of one or more variables with constraints on the type of equality and inequality. Linear programming. Numerical solutions of one-dimensional problems. Numerical solutions of multi-dimensional problems with and without constraints. Fundamentals of variational calculus. Direct methods of variational calculus. Optimal control. Pontryagin`s maximum principle. Dynamic programming, linear regulators. Numerical methods of dynamic optimization. Modern optimization procedures: genetic algorithm, simulated annealing, PSO. Application of optimization procedures in training artificial neural networks and fuzzy logic systems. Examples of optimization of practical engineering problems.

Required Reading:
Relevant literature in English, tbd

Weekly Contact Hours: 2	**Lectures: 4**	**Practical work: 2**

Teaching Methods:
Lectures, Numerical and calculation practice. Computer practice. Laboratory practice. Consultations.
The examination is written and oral. The written part consists of at least four parts, in order to achieve a passing grade min 50 % each task must be completed successfully. The course material can be divided into two colloquia. The oral part of the examination is based on a list of examination questions. The colloquia, tests and examination are written. The written part is eliminating. The final grade is formed on the basis of colloquia, homework assignments, written and oral part of the examination.

Knowledge Assessment (maximum of 100 points):

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