Course Unit Descriptor

Study Programme: Computing And Control Engineering

Course Unit Title: Applied Algorithms in Control Systems

Course Unit Code: E2533

Name of Lecturer(s): Erdeljan Aleksandar, Čapko Darko

Type and Level of Studies: master

Course Status (compulsory/elective): elective

Semester (winter/ summer): summer

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:.

Acquiring basic knowledge about advanced algorithms and examples of their application in control systems.

Understanding complexities of algorithms and learning numerous algorithms for common problems in software development.

Learning Outcomes:
Knowledge of advanced algorithms and examples of their application. These algorithms will be implemented and their complexities will be understood in real examples.

Syllabus.
Advanced data structure (B trees, Fibonacci heap). Graph algorithms (network flow, minimum spanning trees, maximum flow, minimum cost, examples). Dynamic programming (principles, elements, optimal substructure, longest common subsequence, optimal binary search trees, examples). Greedy algorithms (types, elements of greedy strategy, methods, examples). Parallel algorithms (dynamic parallel programming, examples). NP- Completeness (examples). Approximation algorithms (set-covering problem, randomization, subset-sum problem, bin packing, knapsack problem, min-cut, examples). Computational geometry. Nature-inspired algorithms (evolutionary algorithms, ant colony optimization, particle swarm optimization, etc.)

Required Reading:
Relevant literature in English, tbd

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

Teaching Methods:
Lectures; Auditory and computer practice; Consultations.

Knowledge Assessment (maximum of 100 points):

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