Course Unit Descriptor

Study Programme: Computing and Control Engineering			
Course Unit Title: Design of Algorithms			
Course Unit Code: RT43N			
Name of Lecturer(s): Ivan Kaštelan			
Type and Level of Studies: Undergraduate			
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: Algebra, Programming languages and data structures			
Course Aims: Learning the fundamentals of algorithm and data structure design, analysis of algorithms and computational problem solving.			
Learning Outcomes: At the end of the course, students should be capable of: measuring the complexity of an algorithmic solution to a problem, design an algorithmic solution to a problem, apply basic algorithms and data structures in problem solving, solve a problem using computational methods.			
Syllabus: Introduction to the analysis and design of algorithms. Asymptotic notation and the rates of growth of common functions. Recursion and master theorem. Sorting algorithms (Insertion Sort, Merge Sort, Heapsort, Quicksort, linear sorting). Fundamental data structures. Binary search trees. Hash tables. Number-theoretic algorithms and the fundamentals of cryptographic systems. Graph algorithms (searching, topological sorting, connected components, shortest paths, minimum spanning trees). Dynamic programming. Greedy algorithms. String algorithms (longest common subsequence). Problem solving.			
Required Reading: T. H. Cormen, C. E. Leiserson, D. L. Rivest, C. Stein: "Introduction to Algorithms", 4th Edition, MIT Press, 2022.			
Weekly Contact Hours:	**Lectures:** 3	**Practical work:** 3	
Teaching Methods: lectures, computer exercises, office hours, exam preparations			

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	**Final exam**	points
Attendance	6	Exam	30
Computer exercises	24		
Tests (4x)	40		