Course Unit Descriptor

Study Programme: Computer Science

Course Unit Title: Theoretical Computer Science

Course Unit Code: CS253

Name of Lecturer(s): Miloš Stojaković

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): Compulsory

Semester (winter/summer): Summer

Language of instruction: Serbian (primary), English (secondary)

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

Number of ECTS Allocated: 6

Prerequisites: Discrete Structures 1

Course Aims:

Students should learn and understand the basic concepts and methods of computer science, all the way from its historical context, laying a solid foundation for an algorithmic approach to problem solving.

Learning Outcomes:

Minimum: At the end of the course, it is expected that a student understands basic notions of complexity theory, using it to distinguish between different classes of problems.

Desirable: At the end of the course, it is expected that a successful student masters the concept of hardness, being able to classify and tackle some standard algorithmic problems based on their complexity.

Syllabus:

Alphabets, words, languages, measuring the information content of words, representation of algorithmic tasks, decidability. Finite automata, regular and context-free grammars.

Turing machines and computability. Complexity theory, space and time complexity. NP-hardness, polynomial reductions, NP-completeness.

Design of polynomial algorithms, examples. Algorithms for hard problems, examples.

Required Reading:

M. Sipser, Introduction to the Theory of Computation. Thomson Learning, 2012.

J. Hromkovič, Theoretical Computer Science: Introduction to Automata, Computability, Complexity, Algorithmics, Randomization, Communication, and Cryptography, Springer, 2011.

J.E. Hopcroft, R. Motwani, J.D. Ullman, Introduction to Automata Theory, Languages, and Computations, Prentice Hall, 2006.

Weekly Contact Hours: 5	**Lectures:** 3	**Practical work:** 2

Teaching Methods:

Blackboard lectures, blackboard exercises.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Practical work		oral exam	50

Preliminary exam(s)	50	…….	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			