Course Unit Descriptor

Study Programme: Computer Science
Course Unit Title: Discrete Structures 1
Course Unit Code: CS152
Name of Lecturer(s): Dragan Mašulović, Maja Pech
Type and Level of Studies: Bachelor Academic Degree
Course Status (compulsory/elective): Compulsory
Semester (winter/summer): Winter
Language of instruction: Serbian (primary), English (secondary)
Mode of course unit delivery (face-to-face/distance learning): Face-to-face
Number of ECTS Allocated: 7
Prerequisites: None

Course Aims:

In this course students shall acquire fundamental mathematical literacy and will understand the notions such as sets (informally), relations and functions; propositional logic and logical inference; mathematical proofs; and will be able to demonstrate and apply those skills in case of finite graphs.

Learning Outcomes:

At the end of the course a successful student will be able to perform simple computations with finite sets, identify equivalence relations and partial orders, identify surjective/injective/bijective functions, compute function composition and inverses of bijective functions, perform basic calculations in the propositional logic, be able to prove mathematical facts directly, using contraposition or mathematical induction, understand basic facts about finite graphs and apply the knowledge acquired above to reason about finite graphs.

Syllabus:

- Sets (Venn diagrams; Union, intersection, complement; Cartesian product; Power sets; Cardinality of finite sets)
- Relations (Reflexivity, symmetry, transitivity; Equivalence relations, partial orders)
- Functions (Surjections, injections, bijections; Inverses; Composition)
- Propositional logic (Logical connectives; Truth tables; Normal forms (conjunctive and disjunctive); Validity of well-formed formula; Propositional inference rules (concepts of modus ponens and modus tollens))
- Limitations of propositional logic (e.g., expressiveness issues)
- The structure of mathematical proofs (Direct proofs; Disproving by counterexample; Proof by contradiction)
- Induction over natural numbers
- Undirected graphs, Directed graphs, Weighted graphs
- Trees, Spanning trees/forests
Graph isomorphism

Required Reading:

R. Garnier, J. Taylor: "Discrete Mathematics: Proofs, Structures and Applications", 3rd Ed, CRC Press, Chapman and Hal 2009

S. G. Krantz: "Discrete Mathematics Demystified", McGraw-Hill, 2009

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	40
Preliminary exam(s)	30+30		
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.			