

<b>Study programme(s):</b> Information Technologies				
<b>Level:</b> Bachelor				
<b>Course title:</b> Discrete Structures 1				
<b>Lecturer:</b> Dragan Mašulović, Maja Pech				
<b>Status:</b> obligatory				
<b>ECTS:</b> 7				
<b>Requirements:</b> ---				
<b>Learning objectives</b> In this course students shall acquire fundamental mathematical literacy and will understand the notions such as sets (informally), relations and functions; propositional and predicate logic and logical inference; mathematical proofs.				
<b>Learning outcomes</b> 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 and predicate logic, be able to prove mathematical facts directly, using contraposition or mathematical induction.				
<b>Syllabus</b> <ul style="list-style-type: none"> <li>• Sets (Venn diagrams; Union, intersection, complement; Cartesian product; Power sets; Cardinality of finite sets)</li> <li>• Relations (Reflexivity, symmetry, transitivity; Equivalence relations, partial orders)</li> <li>• Functions (Surjections, injections, bijections; Inverses; Composition)</li> <li>• 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))</li> <li>• Limitations of propositional logic (e.g., expressiveness issues)</li> <li>• Predicate logic (Universal and existential quantification)</li> <li>• Limitations of predicate logic (e.g., expressiveness issues)</li> <li>• The structure of mathematical proofs (Direct proofs; Disproving by counterexample; Proof by contradiction)</li> <li>• Induction over natural numbers</li> <li>• Recursive mathematical definitions</li> <li>• Structural induction</li> </ul>				
<b>Literature</b> 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				
<b>Weekly teaching load</b>				
Lectures: 3	Exercises: 2	Practical Exercises: 0	Student research: 0	Other: <b>0</b>
<b>Teaching methodology</b> Blackboard lectures, Blackboard exercises				
<b>Grading method (maximal number of points 100)</b>				
<b>Pre-exam obligations</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>	
<i>Colloquium 1</i>	<b>30</b>	<i>Oral exam</i>	<i>40</i>	
<i>Colloquium 2</i>	<b>30</b>			