

<b>Course title: Selected Chapters of Discrete mathematics - didactical approach</b>			
<b>Lecturer: Olga Bodroža-Pantić</b>			
<b>Status:</b> elective			
<b>ECTS:</b> 15			
<b>Requirements:</b>			
<b>Learning objectives:</b> Introduction to the basics of teaching methods in discrete mathematics			
<b>Learning outcomes:</b> Methodical processing of teaching topics in discrete mathematics.			
<b>Syllabus</b>			
<i>Theoretical study</i>			
Generating functions. Harmonic and Catalan numbers. Systems of distinct representatives, Hall's marriage theorem, Min-max theorem. Latin squares. Block design, <a href="#">Hadamard matrices</a> , Steiner systems. Elements of coding theory. Finite geometry and application in the coding theory. Pólya's theory of counting. Graphs. Trees. Minimum Spanning Tree, Prim's and <a href="#">Kruskal's algorithm</a> . Spanning trees of a complete <a href="#">graph</a> with labeled vertices, Cayley's formula.			
Connectivity in graphs. Vertex-connectivity and edge-connectivity. Whitney graph isomorphism theorem. Menger's theorem.			
Eulerian and Hamiltonian graphs. Fleury's algorithm. De Bruijn sequences. Ore's, Dirac's and Bondy–Chvátal theorems. Hamiltonian connected graphs. Line and Total graphs.			
Planar graphs. Regular polyhedra. Descartes-Euler polyhedral formula. Kuratowski-Pontrjagin theorem on planar graphs. Grinberg's theorem.			
Matchings and factorization. Maximum matching, Berge's lemma. König's theorem for bipartite graphs. Hungarian method. Perfect matchings, Tutte's 1-factor theorem, factorizations of complete graphs.			
Graph coloring. Vertex coloring. Brooks' theorem. Edge coloring, König's line coloring theorem, Vizing's theorem, Map coloring. Extremal graphs. Turán's theorem, cages.			
<i>Practical lessons</i>			
<b>References</b>			
1) Derek Holton, The Teaching and Learning of Mathematics at University Level: An Icmi Study Springer, 2001			
2) William Flannery, Calculus Without Tears: Lesson Sheets for Learning Calculus for Students from the 4th Grade Up Publisher: Berkeley Science Books 2002			
3) John P. D'Angelo Douglas B. West Mathematical Thinking: Problem-Solving and Proofs 6y, Prentice Hall; December 17, 1999			
Weekly teaching load	Lectures: 5	Student research:	5
<b>Teaching methods</b>			
Lectures, solving tasks with and without the use of computers. Laboratory classes and tests in PC lab.			
<b>Grading method (maximal number of points 100)</b>			
<b>Pre-exam obligations</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Theoretical study	4	Oral exam	40
Practical lessons	4		
Colloquia	52	.....	
Seminar			