

<b>Study programmes:</b> Doctoral studies of the programme Mathematics – Applied Mathematics			
<b>Course name:</b> 3M542 – Combinatorial Graph Theory with Applications			
<b>Lecturers:</b> Zoran Stanić			
<b>Status:</b> Optional			
<b>ECTS:</b> 9			
<b>Attendance prerequisites:</b> No			
<b>Course aims:</b> Introducing students to the theoretical and practical aspects of the combinatorial graph theory. Working with the relevant software packages.			
<b>Course outcome:</b> Upon completion of the course students has knowledge of combinatorial graph theory, and they are familiar with some of its applications. Trained for independent scientific research in this field. They should also be able to use some of the software packages.			
<b>Course content:</b> Graphs and subgraphs, incidence and adjacency matrix of a graph. Graph invariants. Paths and cycles - a detailed approach. Cyclomatic number of a graph. Vertex and edge connectivity. Trees and their applications. Hamiltonian and Euler cycles and their applications. Graph colouring - a detailed approach. Planar and polyhedral graphs. Kuratowski-Pontriagin theorem. Colouring of planar graphs. Graph matchings and applications. Independent sets, covers and cliques. The inner and outer stability of a graph with the applications in the coding theory. Applications to linear algebra; square matrix powers and Markov chains. Ramsey theory. Directed graphs, block designs, finite geometries and matroids. Software packages and their implementation.			
<b>Literature:</b>			
1. J.A. Bondy, U.S.R. Murty, <i>Graph Theory</i> , Springer, Berlin, 2011.			
2. D. Cvetković, <i>Teorija grafova i njene primene</i> , Naučna knjiga, Beograd, 1986.			
3. Cvetković D., Simić S., <i>Kombinatorika - klasična i moderna</i> , Naučna knjiga, Beograd, 1990.			
<b>Number of hours: 10</b>	<b>Lectures: 4</b>	<b>Research work: 6</b>	
<b>Teaching and learning methods:</b> Lectures and Consultations			
<b>Assessment (maximal 100 points)</b>			
<b>Course assignments</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Lectures	-	Written exam	-
Exercises / Tutorials	-	Oral exam	-
Colloquia	-	Written-oral exam	70
Essay / Project	30		