Study programme(s): Applied Mathematics (MAP)

Course title: DISCRETE MATHEMATICS 2 (P202)

Lecturer(s): Vojislav Petrović, Olga Bodroža-Pantić, Ivica Bošnjak

Course status: compulsory

ECTS points: 7

Requirements:

Learning Objectives

Introduction to basic problems and techniques in combinatorics. Combinatorial configurations. Introduction to basic concepts and techniques of graph theory.

Learning Outcomes

Minimal. Knowledge and application of basic counting principles. Ability to prove simpler theorems from graph theory using standard techniques.

Desirable. Knowledge and application of advanced counting techniques (recurrence relations, generating functions); application of combinatorial configurations (block diagrams, codes). Understanding and using more complex ideas and techniques of graph theory.

Syllabus

Dirichlet's principle. Fundamental counting principles. Choices; permutations and combinations. The inclusion-exclusion formula and its applications. Recurrence relations. Telescoping. Linear recurrence relations with constant coefficients.

Basic concepts of graph theory. Connectivity; articulation points and bridges. Trees. Graph algorithms; the minimum weight spanning tree, DFS and BFS algorithms. Eulerian and Hamiltonian graphs. Matchings and decompositions. Vertex coloring. Edge coloring. Digraphs; basic notions.

Literature

1. D. I. A. Cohen, **Basic techniques of combinatorial theory***,* John Willey & Sons, New York, 1978.
2. D. Mašulović, **Odabrane teme diskretne matematike***,* Departman za matematiku i informatiku, PMF u Novom Sadu, 2007.
3. P. Mladenović, **Kombinatorika,** Društvo matematičara Srbije, Beograd, 2013.
4. R. Tošić, **Kombinatorika***,* Univerzitetski udžbenik, Novi Sad, 1999.
5. J. A. Bondy, U.S.R. Murty, **Graph Theory***,* Series: Graduate Texts in Mathematics, Vol. 244, Springer, 2008.
6. Bošnjak, D. Mašulović, V. Petrović, R. Tošić, **Zbirka zadataka iz teorije grafova***,* Univerzitet u Novom Sadu, 2005.
7. G. Chartrand, L. Lesniak, P. Chang, **Graphs & Digraphs***,* Chapman & Hall, London, 2016.
8. V. Petrović, **Teorija grafova***,* Univerzitet u Novom Sadu, 1998.

Number of active classes	**Lectures: 3**	**Exercises: 3**

Teaching methods

Theoretical instructions. Classical lectures supported by multimedia projectors.

Practical instructions. Classical exercises with possible aid of multimedia projectors.

Grading (maximum number of points 100)

Pre-exam obligations	Points	**Final exam**	Points
colloquia	**50**	oral exam	**50**