Study programme(s): Mathematics (M3)

Level: bachelor

Course title: Combinatorics

Lecturer: Olga I. Bodroža-Pantić, Ivica V. Bošnjak

Status: obligatory

ECTS: 6

Requirements: none

Learning objectives

Acquiring basic knowledge in combinatorics . Introduction to the problems from other sciences where this knowledge is applied. Training students to independently use the techniques and methods of combinatorics.

Learning outcomes

Minimum: Students should be able to count the number of certain combinatorial objects with relatively simple combinatorial description using adopted techniques of enumeration and be acquainted with elementary properties of the combinatorial objects that are familiar in practice.

Desired: Students should be able to independently apply more complex techniques of enumeration in problems that are familiar in practice, and be able to analyze in detail combinatorial objects described by relations between the elements of a system.

Syllabus

Theoretical instruction

Basic concepts of enumeration (principles of bijection, sum and product, permutations, combinations). Binomial and polynomial formulas. Inclusion-exclusion formula. Stirling numbers. Permutation and inversions**.** Stirling's approximation. Recurrence relations. Fibonacci and Lucas numbers. Generative functions. Basic concepts of the graph theory. Problems of enumeration in graph theory.

Practical instruction

Basic principles of counting. Permutations. Combinations. Binomial and polynomial coefficients. Derangement, subfactorial. Modelling combinatorial and geometrical problems with recurrence relations. Linear homogeneous recurrence relations with constant coefficients. Basic concepts of the graph theory. Problems of enumeration in graph theory.

Literature

1. R.Tošić , Kombinatorika , Univerzitetski udžbenik 88 , N.Sad 1999.
2. V.Petrović , Teorija grafova , Univerzitetski udžbenik 69 , N.Sad 1998.
3. D . Mašulović , Odabrane teme diskretne matematike , Departman za matematiku i informatiku PMF u Novom Sadu 0,2007 (udžbenik odobren na sednici Naučno - nastavnog veća PMF u Novom Sadu od 27.12.2006 .)
4. D . Cvetković , Teorija grafova i njene primene , Naučna knjiga , Beograd ,1990
5. D . Veljan , Kombinatorika s teorijom grafova , Školska knjiga , Zagreb , 1989
6. I.Bošnjak , D.Mašulović , V.Petrović , R.Tošić , Zbirka zadataka iz teorije grafova , Departman za matematiku i informatiku , N.Sad ,2006

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 2	Other forms of teaching: 0	Student research: 0	

Teaching methodology

Conventional methods of teaching (PowerPoint Presentation) are used in lectures.
Students practise their skills to understand the problems and find possible solutions during the blackboard exercises. Acquired knowledge and ability to solve the problems are checked in two colloquia (preliminary exams). At the final oral exam, the student demonstrates understanding of the material presented.

Grading (maximum number of points 100)

Pre-exam obligations	points	Final exam	points
Colloquia	50	Oral exam	50