Study programme(s): Mathematics (MA), Master in Mathematics Teaching(MP)

Level: master

Course title: Set Theory (MA-17)

Lecturer: Milan Z. Grulović, Boris B. Šobot

Status: elective

ECTS: 5

Requirements: none

Learning objectives

Introducing students to the basic elements of the set theory and its role in mathematics in general.

Learning outcomes

Minimal: Understanding ordinal and cardinal arithmetic in the amount needed for every mathematician, as well as applications of transfinite recursion in algebra and analysis.
Desirable: Understanding the role of the set theory in formal foundations of mathematics.

Syllabus

Theoretical instruction

Zermelo-Fraenkel axiomatization. Transitive and inductive sets. The set of natural numbers and (transfinite) recursion on it. Well-ordered sets, transfinite induction and recursion. Transitive closures. The axiom of choice. Ordinals, transfinite induction and recursion on the class of ordinals. Ordinal and cardinal arithmetic. Elements of combinatorial set theory. Well-founded relations and the corresponding scheme of transfinite recursion. Well-founded sets.

Practical instruction

Schröder-Bernstein theorem. Checking equipotency of sets. Equivalents of the axiom of choice. Ordinals as representatives of well-orderings. Solving problems in ordinal and cardinal arithmetic.

Literature

1. A. Perović, A. Jovanović, B. Veličković. *Teorija skupova.* Matematički fakultet, Beograd, 2007.
2. K. Kunen. *Set Theory-An Introduction to Independence Proofs.* North-Holland, 1980.
3. T. Jech. *Set Theory, 3rd edition.* Springer, 2002.
4. A. Kron. *Elementarna teorija skupova.* Matematički institut, Beograd, 1992.

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 1	Other forms of teaching: 0	Student research: 0	

Teaching methodology

Lectures are presented using classical teaching methods. Exercises serve for students to apply theoretical knowledge to solve problems and find adequate examples. During the course of the semester, students take two colloquia. The final exam is oral and checks students' general understanding of the material presented.

Grading (maximum number of points 100)

Pre-exam obligations	points	Final exam	points
activity	5	Colloquia	50
practical instructions	5	Oral exam	40