Study programme(s): Mathematics (MA)

Level: master

Course title: Mathematical Logic (MA-04)

Lecturer: Rozália S. Madarász-Szilágyi

Status: obligatory

ECTS: 6

Requirements: none

Learning objectives

To introduce the basic ideas, methods and techniques of mathematical logic, form a comprehensive picture about problems of founding mathematics, introduce the basic questions about the philosophy of mathematics, and present basic knowledge about algorithms and the importance of mathematical logic in computer science.

Learning outcomes

Minimal: Basic knowledge about the development of logic and mathematical logic through centuries, manipulation with concepts of the propositional calculus, the quantification theory and the set theory. A student should know how to recognize the basic laws of human thought and to prove them in a mathematically correct way.

Desirable: Students should have the picture of power and limitations of the formal method in mathematics, as well as of the philosophical foundations of mathematics.

Syllabus

Theoretical instruction:

The development of mathematical logic. Naive set theory and paradoxes. The philosophy of mathematics. Propositional calculus. Completeness and compactness theorems. Quantification theory. Completeness and compactness. Elements of model theory. ZF set theory. Ordinals and cardinals. Formalization of the notion of algorithm. Undecidability. Godel's theorems.

Practical instruction:

Formal derivation in propositional calculus. Syntax and semantics of first-order logic. Models. Logically valid formulas. Ordinals. Cardinal arithmetic. Turing machine. Recursive functions.

Literature

1. R. Madarasz, Matematička logika – e-materijal (2012)
2. E. Mendelson, *Introduction to Mathematical Logic*, D.van Nostrand, 1964.
3. S. Hedman, *A First Course in Logic*, Oxford University Press, 2004.
4. Ž. Mijajlović, *An Introduction to Model Theory*, Novi Sad, 1987.
5. I. Dolinka, *Kratak uvod u analizu algoritama*, Novi Sad 2008.

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

Teaching methodology

Theoretical presentation with continuous interaction with students.

Grading (maximum number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	60	Oral exam	40