Study programme(s): Informatics (IM), Teaching Informatics (IC)

Level: master

Course title: Mathematical logic in computer science (IA-312)

Lecturer: Rozália S. Madarász-Szilagyi, Petar V. Marković

Status: elective

ECTS: 6

Requirements: none

Learning objectives:
The student will be acquainted with the role, concepts and techniques of mathematical logic within theoretical computer science.

Learning outcomes:
By the end of the course, the student will acquire enough knowledge to grasp the role of mathematical logic and, more generally, formal methods, in theoretical computer science.

Syllabus:
Theoretical instruction
Propositional calculus – formulae, models and truth tables. Propositional logic and deductive systems – Hilbert's system, reliability, completeness and resolution. Predicate calculus – formulae, models and truth tables. Predicate logic – deductive systems. Resolution in predicate calculus. Decidability problems. Temporal logics – formulae, models and truth tables. Temporal logics – deductive systems. LTL and CTL. Specification and verification. Model testing. Modal logics. Hoare logic.
Practical instruction
Formal proofs in propositional calculus. Models of propositional calculus. Formal proofs in predicate calculus. Formal proofs in temporal logics.

Literature
1. M. Ben-Ari, Mathematical logic for computer science, Second edition, Springer, 2001.
2. S. Burris, Logic for mathematics and for computer science, prentice Hall, 1998.
3. P. Janičić, Matematička logika u računarstvu, Matematički fakultet, Beograd, 2009.
4. M. Huth, M. Ryan, Logic in Computer Science, Cambridge university Press, 2002.

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

Teaching methodology
Lectures are presented using classical teaching methods. Principles of heuristic, with maximal student participation is used in practical instruction classes. At the end of the course, students will take two tests, A and B. Test A will consist of short true/false questions and will determine whether the student understood the concepts taught. Test B will consist of problems that are more complex and will test students' ability to independently solve mathematical problems. Test B may be replaced by a writing assignment of a short paper to students, the topic of which would be a survey of certain modern applications of logic to computer science.

Grading (maximum number of points 100)

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