Course title: Logic for Mathematics with Applications	**Neptun code: GEMAN421-a**
Course coordinator: Dr. Sándor Lajos Radeleczki, PhD, dr. habil., professor	
type of lesson and number of lessons: **lecture (2)**	
method of evaluation: colloquium	
curriculum location of the subject: (autumn/spring semester): autumn and spring	
pre-study conditions *(if any)*: -	

The task and purpose of the subject:

The objective of the course is to introduce PhD students to the fundamental notions of matjematical logic and its applications in informatical sciences.. The aim of the course is to develop the ability to identify and solve problems within this field.

Course description:

Propositional logic, propositional connectives and elementary switching circuits. Propositional formulas, tautologies and normal forms. Boolean opperations and opperations with sets, Boolean algebras. Derivation with premisses, Rules of inference, propositional proof systems, the resolution principle in propositional logic. Boolean functions and their standard form.. Independent and complete systems of Boolean functions. Clones of functions, the completeness theorem of Post. Lattices and duality, Boolean lattices. Minimal forms of Boolean function, the Quine-Mc Cluskey method of minimalizing. The bases of predicate logic, quantifiers, equivalent formulas, the syntax of predicate logic. Prenex normal forms, skolemizing. Rules of inference and derivation, soundness and completeness. First order formulas, first order languages and models. The Compactness theorem. Proof systems and proof theory. Clauses in predicate logic. Resolution in predicate logic. Semantical trees. Appications: formalization, program graphs, the bases of logical programming.

Required literature:

1. Stanley N. Burris: Logic for Mathematics and Computer Science, Prentice Hall, New Jersey, 1998.
2. J.K. Truss, Discrete Mathematics for Computer Scientists, Introductory logic, 1991.
3. U. Schöning, Logic for Computer Scientists, Modern Birhauser Classics, 2008.

Recommended literature:

1. Urbán János: Matematikai Logika (példatár), Műszaki Könyvkiadó, Budapest, 1999 (1983).