Level: bachelor

Course title: Algebra 1 (M4-03)

Status: obligatory

ECTS: 8

Requirements: none

Learning objectives

Systematization of basics of mathematics, logic rules of reasoning; developing the ability to properly and creatively solve mathematical problems.

Learning outcomes

Independent and creative use of the rules of mathematical and logical reasoning to solve complex problems and to prove theorems. Understanding the interpretation and construction of models for predicate formulas. Using axioms and rules to prove theorems. Ability to use knowledge of set constructions, relations and functions in other areas of mathematics and applications.

Syllabus

Theoretical instruction

Propositional logic. Tautology, hypotheses and consequences. Canonical forms. Predicate logic. Interpretation of the model, valid formulas. Construction of mathematical theories: definitions, axioms, theorems, proof. Formal theories. Propositional calculus, predicate calculus. Fundamentals of naive set theory. The notion of relation, algebra of relations. Equivalence relations and partitions. Ordering relations and ordered sets. Upper and lower bounds, infimum and supremum. Function: basic concepts and features. Functions with special properties. Inverse function. The kernel functions. Families of sets. Equivalent sets, countable and uncountable sets, the cardinals. Operations, the concept and examples of operational and relational structures. Basic laws on known algebraic structures.

Practical instruction

Problems dealing with propositional and predicate logic. Establishing rules and laws of mathematical and logical reasoning through the examples and problems from different mathematical fields. Construction of models for sets of predicate formulas. Deductions. Different constructions of new sets. Constructing equivalence relations and quotient sets. Analysis and interpretation of well-known ordering relations, as well as of various types of functions and their application. Basic examples and properties of groupoids and identities.

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