Level: bachelor

Course title: Theoretical Foundations of Informatics 2 (I252)

Status: obligatory

ECTS: 7

Requirements: none

Learning objectives

Acquiring the basic knowledge and skills related to the Automata Theory and regular languages, and learning the basic theoretical algorithms characteristic for this area.

Learning outcomes

Minimal: Students should be able to apply fundamental algorithms in automata theory such as recognizing the language accepted by a given automaton and constructing an automaton that accepts a given language.

Optimal: High level of understanding and applying the automata theory and ability to solve problems connected with acquired notions in a creative way.

Syllabus

Theoretical instruction

Words and languages. Algebra of languages. Regular expressions and identities in the algebra of languages. Semiautomaton. Monoid and syntactical monoid of a semiautomaton. Deterministic and nondeterministic finite automaton. The language of an automaton. Equivalence of deterministic and nondeterministic automata. Kleene's theorem: analyzing and constructing automata. Pumping lemma. Myhill-Nerode's theorem. Minimal automaton. An algorithm for minimizing a given deterministic automaton.

Practical instruction

The value of regular expressions. Equivalence of regular expressions and fundamental identities in the algebra of languages. *Ad hoc* methods for analyzing and constructing finite automata. Constructing of a deterministic automaton that is equivalent to a given nondeterministic automaton. Some applications of Kleene's theorem, Pumping lemma and Myhill-Nerode's theorem. Constructing of a minimal automaton equivalent to a given finite deterministic automaton.

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