FORMAL LANGUAGES AND AUTOMATA THEORY

Title of Study Programme and Code	Type (compulsory/optional)	Cycle	Year of study when the component is delivered (if applicable)
Information Systems Engineering 6531EX043	Compulsory	1st	2st year
Semester/trimester when the component is delivered	**Number of ECTS credits allocated**	**Language of instruction**	**Mode of delivery (face-to-face/e-learning/…)**
3rd	3 ECTS	English	

Learning outcomes		Study methods	Assessment methods
After completion of the study subject, a student should be able to:		Interpretation of new concepts (terms); Exercises-solving; Self-employment.	Assessment of exercises solving; Exam.
LO 1	Know the essence of Finite Automata as language recognizers.		
LO 2	Create Finite Automata models for the acception of given languages.		
LO 3	Perform equivalent transformations of finite automata.		
LO 4	Use Finite Automata models to solve the tasks of formal languages analysis.		
LO 5	Use Finite Automata with Output to solve the tasks.		
LO 6	Understand the essence of Turing Machines.		

Prerequisites
(these courses must be sucessfully completed prior to taking this particular course)

Discrete Mathematics, Information Technologies and Programming Fundamentals, Electrotechnics and Electronics.

Course content

1. Definition of formal languages. Finite Automata as recognizer for regular languages.
2. Regular expressions and Finite Automata. Regular and irregular languages.
3. Context-free grammar. Minimization of finite automata. Equivalence classes.
4. Syntactic analysis. Ambiguous grammar. Stack type machine (Pushdown automata). Context free and context sensitive languages. Chomsky normal form.
5. Finite Automata with output.
6. Boolean functions, their visualization and minimization.
7. Structural machines, coding and realization.
8. Turing machine.

Recommended or required reading and other learning resources/tools

1. Gerda Ivanickienė. The theoretical material and exercises.

2. D. Goswami and K. V. Krishna. Formal Languages and Automata Theory: http://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. Introduction to Automata and Complexity Theory: http://infolab.stanford.edu/~ullman/ialc/spr10/spr10.html
4. Formal Languages and Automata Theory: http://cs.fit.edu/~dmitra/FormaLang