

Subject card

Subject name and code	Automata, languages and computational complexity, PG_00143570						
Field of study	Informatics						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2026/2027	
Education level	Bachelor's studies		Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study	
Mode of study	full-time studies		Mode of delivery			at the university	
Year of study	2		Language of instruction			Polish	
Semester of study	4		ECTS credits			4.0	
Learning profile	academic		Assessment form			exam	
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Andrzej Szepietowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		0.0		40.0	100
Subject objectives	The aim of the course is to introduce the basics of automata theory and formal languages, develop skills in manipulating regular expressions, and using context-free grammars.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[INFL3_U02] can precisely formulate questions to deepen one's understanding of a given topic or find missing elements of reasoning		Can formulate precise questions regarding the computational complexity of problems.			[SU4] test/exam - oral or written	
	[INFL3_U03] can design and analyze algorithms for their correctness and computational complexity using appropriate algorithmic techniques and data structures		Can analyze basic problems and algorithms in terms of computational complexity.			[SU4] test/exam - oral or written	
	[INFL3_W03] has structured, theoretically grounded general knowledge in the field of algorithms and data structures, formal languages, automata theory and computational complexity, and artificial intelligence		Is familiar with the basics of formal languages. Knows the definitions and examples of regular expressions, finite automata, context-free grammars, pushdown automata, and Turing machines. Understands the definition of time complexity for Turing machines.			[SW4] test/exam - oral or written	

Subject contents	1. Finite automata, regular expressions, nondeterministic automata, determinization theorem, equivalence theorem between finite automata and regular expressions, pumping lemma; 2. Chomsky grammars, context-free grammars, pushdown automata, parse trees. Parsers. Pumping lemma for context-free languages, context-sensitive grammars, linear-bounded automata; 3. Turing machines, recursively enumerable and recursively enumerable languages, decidability and undecidability problems, halting problem.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	tests	51.0%	10.0%
	exam	51.0%	90.0%
Recommended reading	Basic literature	1. J. Hopcroft, J. Ullman - Wprowadzenie do teorii automatów, języków i obliczeń, PWN 1994; 2. J. Jędrzejowicz, A. Szepietowski Języki, automaty, złożoność obliczeniowa Wyd. UG 2008;	
	Supplementary literature	not aplicable	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not aplicable		
Work placement	Not applicable		

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