

Subject card

Subject name and code	Computability and complexity, PG_00144530						
Field of study	Informatics						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2026/2027	
Education level	Master'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	3		ECTS credits			6.0	
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		90.0	150
Subject objectives	The aim of the course is to develop students' mathematical culture, develop intuition about computability barriers and the theory of complexity of computations, and the ability to determine whether an algorithm can be given for a given problem, whether a polynomial algorithm can be given, or whether the problem is NP-complete.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[INFMU2_K01] knows the limits of his own knowledge and understands the need for further learning		knows the limits of his own knowledge and understands the need for further learning			[SK1] oral statement/conversation/discussion	
	[INFMU2_U04] Defines formal languages using grammars and automata; distinguishes between decidable and undecidable problems.		defines formal languages using grammars and automata			[SU4] test/exam - oral or written	
	[INFMU2_U05] can apply known algorithms in specific situations, can effectively select the type of algorithm depending on the problem at hand		can estimate the time complexity of an algorithm/language			[SU4] test/exam - oral or written	
	[INFMU2_W02] has in-depth knowledge of formal languages, models of computation, and issues of computational complexity; is familiar with the formal apparatus for formulating and studying the properties of computer objects		has in-depth knowledge of formal languages, computational models and computational complexity issues			[SW4] test/exam - oral or written	

Subject contents	Chomsky's hierarchy. Turing machines, deterministic and non-deterministic. Languages and decision-making problems. Time complexity (P and NP classes, NP-complete problems). Examples of NP-complete problems. Reduction of problems. Memory complexity. Elements of decidability theory. Turing-Church hypothesis. Decidable and undecidable problems. Rice's theorem.		
Prerequisites and co-requisites	Introduction to mathematics.		
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	J. Jędrzejowicz, A. Szepietowski, Języki, automaty, złożoność obliczeniowa, Wydawnictwo UG, 2008.	
	Supplementary literature	C. H. Papadimitriou, Złożoność obliczeniowa, WNT 2002	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not applicable		
Work placement	Not applicable		

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