University of Gdańsk

Subject card

Subject name and code	Mathematical Foundations of Computer Science, PG_00204162		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	practical	Assessment form	credit
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	dr Maciej Dziemiańczuk	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

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	30	0.0	20.0	50

Subject objectives

The aim of the course is to introduce the basics of automata theory and formal languages, develop skills in working with regular expressions, using context-free grammars, and basic Turing machines. Familiarizing students with English terminology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[INFPL3_U01] can apply mathematical knowledge to formulate, analyse and solve tasks related to computer science, design and analyze algorithms in terms of their correctness and computational complexity	Can analyze simple problems in terms of computational complexity.	[SU4] test/exam - oral or written
[INFPL3_K02] is ready to recognize the importance of knowledge in solving cognitive problems and practical and seeking opinions experts in case of difficulties with independent problem solving	Can formulate precise questions regarding the computational complexity of problems. Is ready to use technical documentation, professional literature and expert sources.	[SK4] test/exam - oral or written
[INFPL3_W02] knows and understands advanced concepts in artificial intelligence, formal languages, and numerical methods.	Has basic knowledge in the field 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

<table>
<tr><td>Subject contents</td><td colspan="3">1. Finite automata, regular expressions, nondeterministic automata, determinization theorem, equivalence of finite automata and regular expressions theorem, pumping lemma. 2. Context-free grammars, pushdown automata, parse trees. 3. Turing machines.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td colspan="3"></td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. J. Jędrzejowicz, A. Szepietowski, Języki Automaty Złożoność Obliczeniowa, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 2008. 2. J. E. Hopcroft, J. D. Ulman, Introduction to automata theory, languages and computing, Addison-Wesley, 1979.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">not applicable</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">not applicable</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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