

Subject card

Subject name and code	Advanced Algorithms, PG_00203638						
Field of study	Informatics						
Date of commencement of studies	October 2026	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	part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
Learning profile	academic	Assessment form			exam		
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	20.0	0.0	20.0	0.0	0.0	40
	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	40	0.0	85.0	125		
Subject objectives	The aim of the course is to familiarize students with basic techniques for designing parallel algorithms. Familiarizing students with English terminology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[INFMU2_W11] knows and understands in depth the principles of designing and implementing complex software systems, the impact of system architecture on its concurrency, performance and scalability, concurrent and parallel processing models and their application in modern systems						
	[INFMU2_W02] has in-depth knowledge of models of computation, and issues of computational complexity; is familiar with the formal apparatus for formulating and studying the properties of computer objects						
	[INFMU2_U03] can design and analyze for correctness and computational complexity, and build algorithms using advanced programming techniques		Can assess the computational complexity of designed algorithms. Can design constant-time or logarithmic-time parallel algorithms for simple problems.		[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 design an algorithm utilizing techniques such as balanced tree, pointer jumping, tree contraction, and Eulerian cycle.		[SU4] test/exam - oral or written		

Subject contents	1. PRAM model assumptions, potential conflicts and their resolution in PRAM sub-models; 2. Writing parallel algorithms; 3. Parameters of parallel algorithms; 4. Methods for designing parallel algorithms: balanced tree method, pointer jumping (algorithms on lists), divide and conquer, breaking symmetry, Eulerian cycle technique; 5. Selected algorithms: prefix sum algorithms, binary number addition, arithmetic expression tree evaluation, sorting, cycle coloring.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	50.0%
	tests	51.0%	50.0%
Recommended reading	Basic literature	1. Joseph Jaja, <i>An Introduction to Parallel Algorithms</i> , Addison-Wesley Publishing Company, 1992; 2. Selim Akl, <i>The Design and Analysis of Parallel Algorithms</i> , Prentice-Hall, 1989.	
	Supplementary literature	not applicable	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not applicable		
Work placement	Not applicable		

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