

Subject card

Subject name and code	Advanced Algorithms, PG_00155255						
Field of study	Informatics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	Master's studies		Subject group		Obligatory subject group 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 polish		
Semester of study	2		ECTS credits		7.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Maciej Dziemiańczuk				
	Teachers		dr Maciej Dziemiańczuk mgr Łukasz Mielewczyk				
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		135.0	175
Subject objectives	The aim of the course is to familiarize students with basic techniques for designing parallel algorithms.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[INFMU2_U03] designs, analyzes for correctness and computational complexity, and builds algorithms using advanced programming techniques and data structures		Can assess the computational complexity of designed algorithms. Can design constant-time or logarithmic-time parallel algorithms for simple problems.		[SU1] oral statement/conversation/discussion [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.		[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written		
	[INFMU2_W04] knows complex data structures and advanced methods of algorithmic solution of computationally difficult problems (exponential algorithms, approximation, heuristics)		Is familiar with selected data structures used by parallel algorithms. Is familiar with techniques for designing parallel algorithms.		[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion		
	[INFMU2_K01] knows the limits of his own knowledge and understands the need for further learning		Can formulate opinions on parallel algorithms.		[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written		
	[INFMU2_K03] is able and ready to formulate opinions on basic IT issues		Understands the necessity of expanding their knowledge in the field of designing parallel algorithms.		[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work		

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
	activity on classes	0.0%	5.0%
	exam	50.0%	50.0%
	tests	50.0%	45.0%
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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