

Subject card

Subject name and code	Advanced Algorithms, PG_00203707						
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	full-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 Janusz Dybizbański				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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	65.0	125		
Subject objectives	The aim of the course is to familiarize students with the basic techniques of designing parallel algorithms.						
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 design an algorithm using the balanced tree technique, pointer jumping, and Euler cycle can determine the computational complexity of the designed algorithms			[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 using the balanced tree technique, pointer jumping, and Euler cycle			[SU4] test/exam - oral or written		

Subject contents	<ul style="list-style-type: none"> • assumptions of the PRAM model, possible conflicts and their resolution in PRAM submodels • two methods of writing parallel algorithms • parameters of parallel algorithms • parallel algorithm design methods: <ul style="list-style-type: none"> • balanced tree method, • pointer jumping, • divide-and-conquer, • symmetry breaking, • pipelining, • Euler cycle technique, • selected algorithms: arithmetic expression tree evaluation, minimum spanning tree, sorting, cycle coloring 														
Prerequisites and co-requisites	no requirements														
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>activity in classes</td> <td>0.0%</td> <td>5.0%</td> </tr> <tr> <td>exam</td> <td>51.0%</td> <td>50.0%</td> </tr> <tr> <td>tests</td> <td>51.0%</td> <td>45.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	activity in classes	0.0%	5.0%	exam	51.0%	50.0%	tests	51.0%	45.0%
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Recommended reading	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 45%;">Basic literature</td> <td colspan="2" data-bbox="799 602 1477 909"> [1] Joseph JaJa, An Introduction to Parallel Algorithms, Addison-Wesley, [2] Selim Akl, The Design and Analysis of Parallel Algorithms, Prentice-Hall. [3] Henri Casanova, Arnaud Legrand, Yves Robert, Parallel Algorithms, Chapman & Hall. </td> </tr> <tr> <td>Supplementary literature</td> <td colspan="2" data-bbox="799 916 1477 949">no applicable</td> </tr> <tr> <td>eResources addresses</td> <td colspan="2" data-bbox="799 956 1477 976"></td> </tr> </table>			Basic literature	[1] Joseph JaJa, An Introduction to Parallel Algorithms, Addison-Wesley, [2] Selim Akl, The Design and Analysis of Parallel Algorithms, Prentice-Hall. [3] Henri Casanova, Arnaud Legrand, Yves Robert, Parallel Algorithms, Chapman & Hall.		Supplementary literature	no applicable		eResources addresses					
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Example issues/ example questions/ tasks being completed	no applicable														
Work placement	Not applicable														

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