

Subject card

Subject name and code	Combinatorial optimization, PG_00143561						
Field of study	Informatics						
Date of commencement of studies	October 2024	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	3	Language of instruction			Polish Polish		
Semester of study	5	ECTS credits			3.0		
Learning profile	academic	Assessment form					
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Paweł Żyliński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		45.0	75
Subject objectives	A review of advanced algorithmic methods based on applications in graph theory, computational geometry, and other optimization issues.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[INFL3_U02] can precisely formulate questions to deepen one's understanding of a given topic or find missing elements of reasoning		is able to distinguish and isolate such properties of problems that allow the use of a specific technique;			[SU4] test/exam - oral or written [SU5] implementation of a problem task	
	[INFL3_W03] has structured, theoretically grounded general knowledge in the field of algorithms and data structures, formal languages, automata theory and computational complexity, and artificial intelligence		knows selected methods of algorithmic solving of computationally difficult problems, e.g. approximation algorithms, approximation schemes, randomized algorithms, integer linear programming; knows selected algorithmic techniques with examples of applications: e.g. sweep-line technique, flows in networks;			[SW4] test/exam - oral or written [SW5] implementation of a problem task	
	[INFL3_U03] can design and analyze algorithms for their correctness and computational complexity using appropriate algorithmic techniques and data structures		is able to apply the acquired techniques to solve algorithmic problems; tries to analyze the constructed solutions in terms of computational complexity and solution optimality;			[SU4] test/exam - oral or written [SU5] implementation of a problem task	
	[INFL3_W10] knows the basic principles of occupational health and safety in the IT profession		knows the basic principles of occupational health and safety in the IT profession;			[SW5] implementation of a problem task	

Subject contents	<ol style="list-style-type: none"> 1. Flows in networks with applications. 2. Approximation algorithms and approximation schemes. 3. Randomized algorithms. 4. Sweep-line technique. 5. Linear programming. 														
Prerequisites and co-requisites	<ol style="list-style-type: none"> 1. Discrete mathematics. 2. Linear algebra with analytic geometry. 3. Algorithms and data structures. 4. Graph and network theory (basics). 5. Programming skills. 														
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 34%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>implementing/coding</td> <td>51.0%</td> <td>40.0%</td> </tr> <tr> <td>final test</td> <td>51.0%</td> <td>20.0%</td> </tr> <tr> <td>test</td> <td>51.0%</td> <td>40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	implementing/coding	51.0%	40.0%	final test	51.0%	20.0%	test	51.0%	40.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. M. de Berg, M. van Kreveld, M. Overmars, O. Schwarzkopf: Computational Geometry - Algorithms and Applications, Springer (2000) 2. T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein: Introduction to Algorithms, MIT (2022) 3. S. Dasgupta, C.H. Papadimitriou, U.V. Vazirani: Algorithms, McGraw-Hill Higher Education (2006) 4. V.V. Vazirani: Approximation Algorithms, Springer (2003) 													
	Supplementary literature	<ol style="list-style-type: none"> 1. S. Har-Peled: Geometric Approximation Algorithms, AMS (2011) 2. R. Motwani, P. Raghavan: Randomized Algorithms, Cambridge University Press (1995) 3. F.P. Preparata, M.I. Shamos: Computational Geometry: An Introduction, Springer (1985) 4. M.M. Sysło, N. Deo, J.S. Kowalik: Algorytmy optymalizacji dyskretnej, PWN (1999) 													
	eResources addresses														
Example issues/ example questions/ tasks being completed	not available														
Work placement	Not applicable														

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