

Subject card

Subject name and code	Combinatorial Optimization, PG_00179344						
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		
Semester of study	5		ECTS credits		5.0		
Learning profile	practical		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Hanna Furmańczyk				
	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		0.0	60
Subject objectives	The aim of the course is to familiarise the student with basic optimisation algorithms and the methods used in this field. In addition, the student will be introduced to the basics of algorithmic analysis as well as types of algorithms - exact, approximate approaches.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[INFL3_U08] assesses the usefulness of various paradigms and related programming tools to solve various types of problems		- the student is able to analyse selected combinatorial optimisation algorithms combinatorial optimisation and their implementation in terms of correctness and computational complexity computational complexity, and program these algorithms		[SU4] test/exam - oral or written [SU5] implementation of a problem task		
	[INFL3_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		- the student is able to model problems in the language of graph theory graphs and express these problems in a formalised way		[SU4] test/exam - oral or written [SU5] implementation of a problem task		

Subject contents	The following topics are planned for the course: 1. Selected basics of graph theory (consistency, strong consistency, graph search) 2. Spanning trees and Steiner trees 3. Linear programming method 4. Shortest path problem 5. Flows in networks 6. Selected problems of task scheduling (deterministic model, scheduling on parallel machines, dedicated machines, scheduling of tasks with conflicts) 7. Approximate algorithms 8. Backpacking problems, etc.		
Prerequisites and co-requisites	1. Discrete mathematics 2. Algorithms and data structures 3. Ability to program in any language.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	programming tasks	51.0%	40.0%
	exam	51.0%	40.0%
	colloquium	51.0%	20.0%
Recommended reading	Basic literature	1. B. Korte, J. Vygen, Combinatorial optimization. Theory and algorithm 2. Ch.H. Papadimitriou, K. Steiglitz, Combinatorial optimization. Algorithm 3. P. Brucker, Scheduling algorithms, Springer 2006. 4. J. Wojciechowski, K. Piękosz, Grafy i sieci, PWN 2013.	
	Supplementary literature	none	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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