



Subject card

Subject name and code	Elements of discrete mathematics, PG_00045294						
Field of study	Data Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	first-cycle 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		English		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department Of Algorithms And Systems Modelling -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Joanna Raczek				
	Teachers		dr inż. Joanna Raczek				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	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		4.0		16.0	50
Subject objectives	Acquiring the ability to use a formal mathematical language.						
	Acquiring the ability to express relationships, dependencies, configurations in a strict form.						
	Understanding the essence of proof reasoning and construction.						
	Acquisition of knowledge and practical skills regarding methods and tools, including graph algorithms, for solving various theoretical and practical problems that can be modeled using discrete mathematics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U04] formulates logical solutions to complex or unstructured problems	The student formulates, develops, and critically analyzes strategies for resolving complex problems utilizing discrete mathematics tools.	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_W06] classifies the acquired information, assessing its usefulness in solving the formulated problems	The student assesses the applicability of learned algorithms, methods, and tools by classifying them based on their practical use, and also analyzes and selects information from various sources.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K6_W02] demonstrates advanced preparation in methods and techniques for formulating and solving problems	The student defines, describes, analyzes, explains, and applies advanced methods of discrete mathematics, particularly graph algorithms, in diverse applications, utilizing mathematical language.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
Subject contents	Review of mathematical logic. Set algebra. Propositional statements. Predicate calculus. Mathematical induction. Binary relations: equivalence relations, orders. Basic counting and combinatorics. Graph theory - notation, basic concepts, Eulerian graphs with applications, the Chinese postman problem, Hamiltonian graphs, the traveling salesman problem, properties of trees, planarity, graph colourings, domination in graphs. Dijkstra algorithm, algorithms for minimal spanning tree.		
Prerequisites and co-requisites	Basic mathematical skills		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests	50.0%	100.0%
	Activity in class	0.0%	0.0%
Recommended reading	Basic literature	K. H. Rosen, Discrete Mathematics and Its Applications K. A. Ross, C. R. Wright, Discrete Mathematics	
	Supplementary literature	R.J. Wilson, Introduction to graph theory. E.G. Goodaire, M. M. Parmenter, Discrete Mathematics with Graph Theory, Prentice Hall	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Draw the Hasse diagram for the poset: $(\{1,2,4,6,8\},)$. Does there exist a graph with 5 vertices, every vertex incident with at least one edge but no two edges adjacent? Explain. Acquaintance with a previously unknown definition of a graph theory parameter and the resolution of related problems. Application of discrete mathematics methods and tools in solving puzzles and brainteasers.		
Work placement	Not applicable		

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