GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Discrete Mathematics, PG_00047646		
Field of study	Informatics		
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	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Algorithms and Systems Modelling -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Paweł Obszarski	
	Teachers	dr Paweł Obszarski dr inż. Robert Ostrowski mgr inż. Andrzej Jastrzębski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 4939 Matematyka dyskretna
https://enauczanie.pg.edu.pl/2025/course/view.php?id=4939

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	3.0	37.0	100

Subject objectives

Obtaining skills in formulating thesis using formal mathematical language. Ability of expressing relations, dependencies and configurations in a strict abstract form. Understanding clue of reasoning and proofs construction.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Knows how to use in practice knowledge from graph theory, set theory and others.	[SU4] Assessment of ability to use methods and tools
[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems	Learns about various mathematical models and how to use them in practice.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
[K6_W01] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Knows numerous algorithmic issues from set theory, combinatorics and graph theory.	[SW1] Assessment of factual knowledge
[K6_W44] knows and understands, to an advanced extent, architecture, design principles and methods of hardware and software support for local and distributed information systems, including computing systems, databases, computer networks and information applications, as well as the principles of human-computer interaction, the operation and evaluation criteria of data processing, storage and transfer methods, including computational algorithms, artificial intelligence and data mining as well as standards and methods of IT systems administration, monitoring of processes and robustness to undesirable phenomena and activities	Knows and understands selected mathematical models and algorithms and is able to apply them to computer problems.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
Definition and properties of sets, set algebra.
Theoretical foundations of propositional and predicate logic.
Basic variants of the theorem of mathematical induction and technics of proof.
Definition and properties of binary relations. Definition of equivalence relations, order relations, and closures.
Definition and methods of recognizing combinatorial objects (functions, distributions, partitions - Stirling numbers).
Graph theory - notation, basic concepts, Eulerian graphs, the Chinese postman problem, Hamiltonian graphs, the traveling salesman problem, properties of trees, planarity. Graph coloring.

Course content – exercises
Set operations, solving problems using set properties.
Problems in propositional logic and predicate logic.
Inductive proof.
Investigating binary relations.
Counting combinatorial objects.
Graph theory - solving problems involving graph models, Eulerian graphs, the Chinese postman problem, Hamiltonian graphs, the traveling salesman problem, properties of trees, planarity. Graph coloring.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test 1.	50.0%	45.0%
Classes activity	0.0%	10.0%
Test 2	50.0%	45.0%

Recommended reading

Basic literature	[1] K. A. Ross, C. R. B. Wright, *Matematyka dyskretna*, PWN, Warszawa 1996. [2] R. L. Graham, D. E. Knuth, O. Patashnik, *Matematyka konkretna*, PWN, Warszawa 1996.
Supplementary literature	[3] W. Lipski, W. Marek, *Analiza kombinatoryczna*, PWN, Warszawa 1986. [4] H. Rasiowa, *Wstęp do matematyki współczesnej*, PWN, Warszawa 1984. [5] Robin J. Wilson, *Wprowadzenie do teorii grafów*, PWN, Warszawa 2000.

	eResources addresses	
Example issues/ example questions/ tasks being completed	Data are n balls, each of which weighs 10 g, except for one that weighs 9 g or 11 g using k weighing (weight balance) must decide which ball has a different weight, and whether it is lighter or heavier from the other. Determine the maximum value which n can assume at a given angle as a function f (k). Introduce weighting algorithm for any k and n = f (k).	
Practical activites within the subject	Not applicable	

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