



## Subject card

Subject name and code	Discrete Mathematics, PG_00047646						
Field of study	Informatics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Paweł Obszarski					
	Teachers	mgr inż. Robert Ostrowski mgr inż. Andrzej Jastrzębski dr inż. Joanna Raczek dr Paweł Obszarski					
Lesson types and methods of instruction	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						
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_W41] Knows and understands, to an advanced extent, the operation and evaluation criteria of data processing, storage and transfer methods, including computational algorithms, artificial intelligence and data mining	Understands elements of graph theory and combinatorics crucial in data analysis.	[SW1] Assessment of factual knowledge
	[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.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
	[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_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
Subject contents	Algebra of sets. Propositional calculus. Predicate calculus. Mathematical Induction. Binary relations: equivalence relations, the principle of abstraction, cleanup, closure transitive and equivalence. Counting and generating combinatorial objects (functions, locations, divisions - the number of Stirling). Congruence arithmetic modulo n (the Chinese remainder theorem, Fermat, Euclid's algorithm, the government element in the multiplicative group modulo n). Graph theory - notation, basic concepts, eulerian graphs, the problem of the Chinese postman, hamiltonian graphs, the traveling salesman problem, ownership of trees, planarity. Coloring graphs. Asymptotic of numeric functions - symbols $O()$ with $()$ . Recursive relationships - methods: guessing disturbing, "complicate and simplify" generating functions.		
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, <i>Matematyka dyskretna</i> , PWN, Warszawa 1996. [2] R. L. Graham, D. E. Knuth, O. Patashnik, <i>Matematyka konkretna</i> , PWN, Warszawa 1996.	
	Supplementary literature	[3] W. Lipski, W. Marek, <i>Analiza kombinatoryczna</i> , PWN, Warszawa 1986. [4] H. Rasiowa, <i>Wstęp do matematyki współczesnej</i> , PWN, Warszawa 1984. [5] Robin J. Wilson, <i>Wprowadzenie do teorii grafów</i> , PWN, Warszawa 2000.	
	eResources addresses	Adresy na platformie eNauzanie: Matematyka Dyskretna 2023/24 Lato - Moodle ID: 37402 <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37402">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37402</a>	
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).		
Work placement	Not applicable		