

Subject card

Subject name and code	Mathematics for Informatics - Combinatorics, PG_00143886						
Field of study	Informatics						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	Master's studies	Subject group			Obligatory subject group in the field of study		
Mode of study	part-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish polish		
Semester of study	3	ECTS credits			6.0		
Learning profile	academic	Assessment form			exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Maciej Dziemiańczuk				
	Teachers		mgr Marcin Zakrzewski mgr Michał Zakrzewski dr Maciej Dziemiańczuk				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	20.0	0.0	0.0	40
	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	40		0.0		110.0	150
Subject objectives	The aim of the course is to introduce students to fundamental combinatorial objects, generating functions, and basic counting techniques. Familiarizing students with English terminology.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[[INFMU2_U03] designs, analyzes for correctness and computational complexity, and builds algorithms using advanced programming techniques and data structures	Can utilize knowledge of combinatorics to analyze the computational complexity of algorithms.	[SU4] test/exam - oral or written
	[[INFMU2_U01] can apply mathematical knowledge to formulate, analyze and solve tasks related to computer science	Is familiar with basic combinatorial objects used for describing and analyzing the computational complexity of algorithms. Can derive formulas for the count of simple combinatorial objects such as sequences, permutations, combinations, variations, partitions of numbers, and partitions of sets.	[SU4] test/exam - oral or written
	[[INFMU2_K03] is able and ready to formulate opinions on basic IT issues	Can formulate opinions on basic topics in combinatorics.	[SK8] observation of student's independent or team work
	[[INFMU2_U02] is able to formulate questions with precision, serving to deepen his/her own reasoning on a given topic or to find missing elements of reasoning	Can formulate precise questions regarding basic combinatorial techniques.	[SU8] observation of student's independent or team work
	[[INFMU2_W02] has in-depth knowledge of formal languages, models of computation, and issues of computational complexity; is familiar with the formal apparatus for formulating and studying the properties of computer objects	Is familiar with basic techniques for studying and counting combinatorial objects used in algorithm analysis.	[SW4] test/exam - oral or written
	[[INFMU2_W01] has in-depth knowledge of the branches of mathematics necessary for the study of computer science; has a good understanding of the role and importance of the construction of mathematical reasoning	Is familiar with basic mathematical structures used to describe algorithms. Understands fundamental concepts and techniques used for analyzing the computational complexity of algorithms.	[SW4] test/exam - oral or written
	[[INFMU2_K01] knows the limits of his own knowledge and understands the need for further learning	Is aware of the limitations of their knowledge in combinatorics and understands the need for further learning.	[SK8] observation of student's independent or team work
[[INFMU2_U10] is able to determine the directions of further learning and implement the process of self-education	Can identify areas for further learning in combinatorics and undertake self-education.	[SU8] observation of student's independent or team work	
[[INFMU2_W06] is well acquainted with the principles of health and safety in the IT profession	Is well acquainted with the principles of safety and occupational hygiene in the field of IT.	[SW1] oral statement/ conversation/discussion	
Subject contents	1. Counting combinatorial objects: sequences, subsets, permutations, derangements, set partitions, integer partitions, necklaces, arrangements of balls in boxes; 2. Principle of sum, product, pigeonhole, double counting; 3. Counting non-isomorphic objects, Burnside's lemma and Polya's theorem; 4. Generating functions;		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	50.0%
	tests	51.0%	50.0%
Recommended reading	Basic literature	1. G. E. Martin, Counting: The Art of Enumerative Combinatorics, Springer 2001; 2. P. J. Cameron, Combinatorics, Cambridge University Press, 1994;	
	Supplementary literature	not applicable	

	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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