University of Gdańsk

Subject card

Subject name and code	Mathematics for Informatics - Combinatorics, PG_00143886						
Field of study	Informatics						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2026/2027			
Education level	Master's 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	part-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	6.0			
Learning profile	academic		Assessment form				
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Maciej Dziemiańczuk				
	Teachers						
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_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_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_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
[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_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_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_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.	[SU1] oral statement/conversation/ discussion [SU8] observation of student's independent or team work
[INFMU2_K03] is able and ready to formulate opinions on basic IT issues	Can formulate opinions on basic topics in combinatorics.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[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

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
tests	51.0%	50.0%
exam	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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