University of Gdańsk

Subject card

Subject name and code	Discrete Mathematics, PG_00188811		
Field of study	Mathematics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group 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	5.0
Learning profile	academic	Assessment form	exam
Conducting unit	Division of Set Theory -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Andrzej Nowik	
	Teachers		

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

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	62.0	125

Subject objectives

The aim of the course is to familiarize students with the general methods of discrete mathematics, i.e. mathematics of finite (or at most countable) structures, and to develop students' ability to understand the abstract problems of discrete mathematics. One need these skills to study most areas of mathematics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MATL3_W08] knows and understands at an advanced level the structure of selected mathematical theories, is able to use mathematical formalism to build and analyze mathematical models	The student knows the basic concepts of combinatorics and is able to calculate the number of combinatorial objects.	[SW4] test/exam - oral or written
[MATL3_U09] is able to plan a way to solve a complex problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his/her reasoning	The student is able to efficiently switch between various number systems, knows the basic rules of notation and operations in these systems, in particular the theorems that are the subject of the lecture along with appropriate examples.	[SU4] test/exam - oral or written

Subject contents

Non-decimal numeral systems, binary system.Combinatorics: sequences, permutations, functions, subsets, Newton's symbol, Exclusion/Inclusion Principle,Boolean functions, Boolean expressions.Number theory: divisibility of numbers, congruence relation, Euclid's algorithm, prime factorization of numbers, Chinese remainder theorem, fast exponentiation.Induction and recursion, recursive functions.Graphs: graph isomorphism, trees, spanning trees, algorithm for finding the minimum spanning tree, graph coloring, Euler/ Hamilton cycles and paths, algorithm for finding the shortest path.

Prerequisites and co-requisites

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>tests</td><td>51.0%</td><td>30.0%</td></tr>
<tr><td>exam</td><td>51.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>A. Literatura wymagana do ostatecznego zaliczenia zajęć (zdania egzaminu):

A.1. wykorzystywana podczas zajęć

A. Szepietowski, ,,Matematyka dyskretna", Wydawnictwo WUG, Gdańsk 2006.

A.2. studiowana samodzielnie przez studenta
R.L. Graham, D.E.Knuth, O. Patashnik, ,,Matematyka konkretna", PWN, Warszawa 1996;

Kenneth A. Ross, Charles R.B. Wright, ,,Matematyka dyskretna", PWN, Warszawa 1996;
B. Literatura uzupełniająca
R.J Wilson, ,,Wprowadzenie do teorii grafów", PWN, Warszawa 2004;</td></tr>
<tr><td>Supplementary literature</td><td>R.J Wilson, "An introduction to the graph theory", PWN, Warszawa 2004;</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Formulating the Chinese Remainder Theorem and providing its applications;
2. Sample analysis of a graph - finding its Eulerian cycle (if it exists) using Fleury's algorithm, possibly checking whether sufficient conditions for the existence of Hamiltonian cycles can be applied (Ore's, Dirac's, etc.); finding the minimum spanning tree (here the graph should be weighted)
3. Decoding and encoding the tree using Prufer's code.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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