GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Discrete Mathematics, PG_00036609		
Field of study	Mathematics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Probability Theory and Biomathematics -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Lemańska	
	Teachers		

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

Adresy na platformie eNauczanie:

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	5.0	85.0	150

Subject objectives

Introduction to methods integrating various branches of mathematics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W06	The student knows selected concepts and methods of mathematical logic, set theory and discrete mathematics contained in the foundations of other mathematical disciplines.	[SW2] Assessment of knowledge contained in presentation
K6_U10	He can model and solve discrete problems.	[SU2] Assessment of ability to analyse information
K6_U01	The student is able to formulate theorems and understands them.	[SU2] Assessment of ability to analyse information
K6_U02	He can carry out easy proofs by induction method, he can formulate and solve simple recursive equations.	[SU4] Assessment of ability to use methods and tools
K6_W04	The student knows the Chinese remainder theorem, the basic theorems of the graph theory, the theorem on the existence of a solution for some recursive equations.	[SW2] Assessment of knowledge contained in presentation

<table>
<tr><td>Subject contents</td><td>Elements of combinatorics:
a) Pigeonhole principle, switching on and off principle - 2 hours
Recurrences:
a) Fibonacci sequence, Hanoi towers, simple recursive equations - 2 hours
b) recursive equations, prediction method - second and higher order equations - 4 hours
c) recursive equations, the forming function method - 2 hours
Number theory:
a) integer division, divisibility of numbers, congruence relation, abstraction class, Zm ring, the largest common divisor - 2 hours
b) Euclid's algorithm, extended Euclid's algorithm, prime numbers and relatively prime numbers, reversible elements - 2 hours
c) solving congruence equations, the Chinese remainder theorem, the Euler function,
- 2 hours
d) RSA agorithm - 2 hours
Graphs

basic definitions, types of graphs, graph complementation, graph isomorphism
- 1 hour

Eulerian and Hamiltonian graphs, Euler theorem, Ore theorem, finding the longest and shortest path, the problem of the Chinese postman, - 2 hours
trees - 3 hours
different versions of Hall's theorem - 2 hours
planar graphics - 2 hours
coloring of vertices and edges of graphs - 2 hours</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Tests</td><td>50.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>„Matematyka dyskretna” Andrzej Szepietowski

„Matematyka dyskretna” Kenneth A. Ross, Charles R.B. Wright</td></tr>
<tr><td>Supplementary literature</td><td>http://mediawiki.ilab.pl/index.php/Matematyka_dyskretna_1

„Teoria grafów” Robin Wilson</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Solve the Fibonacci equation. Provide and prove the Chinese claim about the rest. Provide and prove the Euler-Hierholtz theorem. Provide and prove the claim of five colors. Solve the recursive equation. Solve the congruence system. Inductively prove that the n-1 edge is in the tree with n vertices.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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