University of Gdańsk

Subject card

Subject name and code	Discrete Mathematics, PG_00197983		
Field of study	Informatics		
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	1	ECTS credits	7.0
Learning profile	academic	Assessment form	exam
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Andrzej Szepietowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	60.0	0.0	0.0	0.0	105

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	105	0.0	70.0	175

Subject objectives

Familiarization with the basics of discrete mathematics in accordance with the needs of computer science.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[INFOL3_W02] knows and undrstands advanced concepts of discrete mathematics, probabilistic methods and statistics	The student is able to: apply the calculus of sets, relations and functions to describe computer-science problems; perform combinatorial and probabilistic computations (incl. Markov and Chebyshev inequalities); simplify Boolean functions; apply number-theory algorithms (Euclidean algorithm, modular exponentiation, Chinese remainder theorem, RSA); solve recurrence equations and apply generating functions; use basic data structures and apply graph algorithms (Eulerian cycles, shortest path, planarity, colouring).the student has basic knowledge of probability theory	[SW4] test/exam - oral or written
[INFOL3_U02] is able to use his/her knowledge of higher mathematics to model and solve complex problems	The student has basic knowledge of discrete mathematics covering: set theory (relations, functions, abstraction classes), computer arithmetic and numeral systems, combinatorics, fundamentals of probability, Boolean functions, number theory (divisibility, congruences, prime numbers, fundamentals of cryptography), recurrences and generating functions, basic data structures and graph theory.	[SU4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>Set theory: operations on sets, relations and functions, equivalence relations and classes of abstraction.
Arithmetic: counting systems, representation of numbers in computers,
Combinatorics: sequences, functions, permutations, Newton's symbol, Dirichlet's drawer rule.
Probability: independence of events, Bernoulli scheme, random variables, expected values, averages, variances, Markov and Chebyshev inequalities.
Boolean functions: Boolean algebra, Boolean expressions and functions, Boolean networks.

Number theory: divisibility of numbers, greatest common divisor, Euclid's algorithm, congruence relation, prime numbers and prime number distribution theorems, prime number recognition, Euler's theorem, Chinese remainder theorems, fast exponentiation algorithm, linear and RSA ciphers.
Recursions, examples of recursive algorithms, Towers of Hanoi, solving linear recursions, generating functions and their applications.
Data structures: queue stacks, trees, tree search algorithms, arithmetic expression representation, binary search, merge sort.
Undirected and directed graphs, trees, tree counting, Euler cycles and paths, searching Euler cycles, Hamilton graphs, associations in graphs, shortest path search, planarity of graphs, graph coloring.</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>tests</td><td>51.0%</td><td>10.0%</td></tr>
<tr><td>exam</td><td>51.0%</td><td>90.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Andrzej Szepietowski, Matematyka dyskretna, Wyd. Uniwersytetu Gdańskiego 2004.</td></tr>
<tr><td>Supplementary literature</td><td>not applicable</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>not applicable</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.