



## Subject card

Subject name and code	Discrete Mathematics, PG_00036609						
Field of study	Mathematics						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022		
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		dr inż. Magdalena Lemańska				
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_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		
	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_U01		The student is able to formulate theorems and understands them.		[SU2] Assessment of ability to analyse information		
	K6_U10		He can model and solve discrete problems.		[SU2] Assessment of ability to analyse information		
	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		

Subject contents	<p>Elements of combinatorics: a) Pigeonhole principle, switching on and off principle - 2 hours</p> <p>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</p> <p>Number theory: a) integer division, divisibility of numbers, congruence relation, abstraction class, <math>\mathbb{Z}_m</math> 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 algorithm - 2 hours</p> <p>Graphs</p> <p>basic definitions, types of graphs, graph complementation, graph isomorphism - 1 hour</p> <p>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</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests	50.0%	60.0%
	Exam	50.0%	40.0%
Recommended reading	Basic literature	„Matematyka dyskretna” Andrzej Szepietowski	
		„Matematyka dyskretna” Kenneth A. Ross, Charles R.B. Wright	
	Supplementary literature	<a href="http://mediawiki.ilab.pl/index.php/Matematyka_dyskretna_1">http://mediawiki.ilab.pl/index.php/Matematyka_dyskretna_1</a>	
		„Teoria grafów” Robin Wilson	
	eResources addresses		
Example issues/ example questions/ tasks being completed	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.		
Work placement	Not applicable		