

Subject card

Subject name and code	Discrete mathematics, PG_00156397						
Field of study	Bioinformatics						
Date of commencement of studies	October 2025		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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Division of Mathematical Methods of Physics -> Institute of Theoretical Physics and Astrophysics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Krzysztof Szcztygielski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	20.0	0.0	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		35.0	75
Subject objectives	Familiarizing students with basic notions of discrete mathematics and their applications in computer science.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[BIOINL3_U03] Graduate applies fundamental mathematical and statistical methods to describe phenomena and analyze data; has the ability to perform basic data analysis in professional databases used in bioinformatics		Student is able to recognize the type of relations, prove simple equations and inequalities by mathematical induction, count the number of elements of finite sets, solve recursions of specific types, determine and compare the asymptotic grow of sequences and functions.		[SU1] oral statement/conversation/discussion [SU3] text preparation/written work [SU4] test/exam - oral or written		
	[BIOINL3_W03] Has sufficient knowledge of mathematical and statistical methods in order to describe and model biological phenomena and processes		Student knows the concept of relations and their basic types, the method of mathematical induction, the notion of recursions, loops and loop invariants, methods of calculating finite sums, the concept of asymptotic growth rate and the big O notation, basic combinatorial concepts and their relationship to functions between finite sets, basic theorems concerning counting of finite sets, basic concepts of graph theory.		[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW3] text preparation/written work		
Subject contents	1. Relations and their properties, equivalence relation and orders 2. Natural numbers and mathematical induction 3. Recurrences, loops and loop invariants 4. Finite sums 5. Asymptotic grow and big O notation 6. Combinatorics and counting finite sets 7. Elements of graph theory						

Prerequisites and co-requisites	Knowledge of matrix calculus and basics of differential and integral calculus of a real function of one variable.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Classwork	51.0%	50.0%
	Final test	51.0%	50.0%
Recommended reading	Basic literature	1. K. A. Ross, Ch. R. B. Wright, <i>Discrete Mathematics</i> , PWN Warsaw 2012 2. R. L. Graham, D. E. Knuth, O. Patashnik, <i>Concrete Mathematics</i> , PWN Warsaw 2011 3. W. Lipski, <i>Combinatorics for programmers</i> , WNT 1982	
	Supplementary literature	1. P. G. Higgs, T. K. Attwood, <i>Bioinformatics and molecular evolution</i> , PWN Warsaw 2011	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Example topics covered in the class: 1. Investigating the truth value of various statements and propositional formulas. 2. Studying the properties of binary relations (reflexivity, symmetry, antisymmetry, transitivity, totality) and determining the type of relation. 3. Investigating equivalence relations and equivalence classes (with particular emphasis on congruence relations). 4. Proving using mathematical induction. 5. Solving recurrences of a specific type. 6. Calculating finite sums using various methods.		
Work placement	Not applicable		

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