

Subject card

Subject name and code	Discrete Mathematics, PG_00193522						
Field of study	Bioinformatics						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
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 Szczzygielski				
	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 mathematical and statistical methods to describe phenomena and analyze data; has the ability to perform 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		
	[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		
Subject contents	<ol style="list-style-type: none"> 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%
	Exam	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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