University of Gdańsk

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 Szczygielski	
	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

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

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of matrix calculus and basics of differential and integral calculus of a real function of one variable.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Classwork</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>Exam</td><td>51.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. K. A. Ross, Ch. R. B. Wright, Discrete Mathematics, PWN Warsaw 2012

2. R. L. Graham, D. E. Knuth, O. Patashnik, Concrete Mathematics, PWN Warsaw 2011

3. W. Lipski, Combinatorics for programmers, WNT 1982</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. P. G. Higgs, T. K. Attwood, Bioinformatics and molecular evolution, PWN Warsaw 2011</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">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.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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