University of Gdańsk

Subject card

Subject name and code	Mathematical Methods of Bioinformatics - Discrete Probability Theory, PG_00193517						
Field of study	Bioinformatics						
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	2		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Institute of Theoretical Physics and Astrophysics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Anita Dąbrowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30		0.0		20.0	50
Subject objectives	The aim of the classes is to familiarize students with basic concepts of discrete probability theory, particularly focusing on discrete random variables (including multidimensional ones), their distributions, and characteristics.						

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	The student is able to: Construct and analyze a probabilistic model of a random experiment. Solve problems using formulas for total probability and Bayes' theorem. Determine the probability distribution and cumulative distribution function of a discrete random variable. Calculate probabilities of events related to random variables. Compute the expected value, variance, ordinary and central moments of discrete random variables. Determine the distribution of a random vector, its cumulative distribution function, and marginal distributions. Investigate the independence of random variables. Calculate mixed moments, covariance, correlation coefficient, and determine the distribution of a function of a random vector.	[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	The student knows: Definition of a probability space. Concepts of elementary event and random event. Definition of probability. Concept of conditional probability and independence of events. Formulas for total probability and Bayes' theorem. Bernoulli scheme and examples thereof. Definition of discrete random variable. Determination of probability distribution and cumulative distribution function of a discrete random variable. Examples of discrete distributions and their applications. Definition and interpretation of numerical characteristics of random variable distributions: expected value, ordinary and central moments. Definition of random vector, its probability distribution, cumulative distribution function, and marginal distributions. Concept of product distribution. Concept of independence of random variables. Definition and methods for calculating mixed moments, covariance, correlation coefficient.	[SW4] test/exam - oral or written [SW3] text preparation/written work

Subject contents

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Prerequisites and co-requisites

Knowledge of basic calculus and fundamentals of combinatorics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	51.0%	60.0%
	51.0%	40.0%

Recommended reading

Basic literature	n
Supplementary literature	n
eResources addresses	

Example issues/ example questions/ tasks being completed

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Work placement

Not applicable

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