University of Gdańsk

Subject card

Subject name and code	Statistics with elements of mathematics in biological sciences, PG_00146880		
Field of study	Genetics and Experimental Biology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	undergraduate 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	1	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Pracownia Fizjologii Roślin i Toksykologii -> Katedra Biologii Eksperymentalnej i Biotechnologii Roślin -> Faculty of Biology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Agnieszka Bańcik-Remisiewicz	
	Teachers	dr Agnieszka Bańcik-Remisiewicz	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Additional information:
Multimedia-based lecture

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	6.0	14.0	50

Subject objectives

1. To prepare students to use basic methods of statistical analysis and to apply them in the interpretation of biological phenomena and processes.

2. To acquaint students with the tools of mathematics necessary to understand the laws of nature and to describe life processes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GBEL3_U01] Independently perform practical tasks in the field of biological sciences and related disciplines, formulate research problems, analyze their results, and draw conclusions.	The graduate is able to independently perform practical tasks in the field of statistics and mathematics, formulate research problems, analyze their results and draw conclusions.	[SU4] test/exam - oral or written
[GBEL3_W05] the principles of research planning based on achievements in biological sciences and related fields, the potential application of their results in practice, the principles of operation of equipment and apparatus used in molecular genetics research, and the principle of interpreting biological phenomena and processes based on empirical data in research and practical activities, with consideration for sustainable use of biological diversity.	The graduate has knowledge of the principles of planning research based on the achievements of biological sciences and related fields and the possibility of using the results in practice, the graduate knows the principle of interpreting biological phenomena and processes based on empirical data in research work and practical activities.	[SW4] test/exam - oral or written
[GBEL3_U02] Utilize computer programs for performing analyses and calculations, as well as utilize databases and bioinformatics tools to solve biological problems.	The graduate is able to choose an appropriate computer program used for statistical analysis of research results in the field of biological sciences.	[SU4] test/exam - oral or written
[GBEL3_W02] Knowledge of mathematics, physics, and chemistry is necessary for understanding biological phenomena and processes, as well as their application in research methodology.	The graduate has the knowledge of mathematics to the extent necessary to understand biological phenomena and processes and their application in research methodology.	[SW4] test/exam - oral or written
[GBEL3_K07] Lifelong learning and updating knowledge in the field of molecular genetics and other disciplines.	The graduate understands the need for lifelong learning and updating their knowledge of molecular genetics, statistics and mathematics and related disciplines.	[SK8] observation of student's independent or team work

Subject contents

Statistics: Basic concepts of statistics (types of variables, types of scales, rules for approximating numbers, histograms). Descriptive statistics: samples size, arithmetic, geometric and harmonic mean, variance, standard deviation, coefficient of variation, standard error, median and modal value, skewness, confidence interval. Binomial and normal distributions. Statistical hypothesis testing. Homogeneity of variance (Snedecor's F test). Student's t-test. One-way analysis of variance and Kruskal-Wallis test. The chi-square test. Selected non-parametric tests. Correlation and simple regression.

Mathematics: Introduction to the calculus of probability. Number sequences and series. Derivative of a function and its application. Integral calculus of functions of one variable: the indeterminate and determinate integral, methods of calculating integrals and their application. Real and imaginary numbers. Actions on matrices.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written test	51.0%	100.0%

Recommended reading

Basic literature	Baścik-Remisiewicz A., Chincinska I., Miklaszewska M. 2020. Wybrane zagadnienia ze statystyki i matematyki. Przewodnik do ćwiczeń dla studentów biologii. Wydawnictwo Uniwersytetu Gdańskiego Łomnicki A. 2014. (lub wydania wcześniejsze). Wprowadzenie do statystyki dla przyrodników. PWN, Warszawa. Krysicki W., Włodarski L. 2015. (lub wydania wcześniejsze). Analiza matematyczna w zadaniach. Część I i II. PWN, Warszawa
Supplementary literature	Wrzosek D. 2010. (lub wydania wcześniejsze). Matematyka dla biologów. Wydawnictwo Uniwersytetu Warszawskiego.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Work placement	Not applicable

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