University of Gdańsk

Subject card

Subject name and code	Introduction to statistics for life sciences, PG_00177035		
Field of study	Chemistry		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	Master'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	English
Semester of study	4	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Adam Sieradzan	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	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	10.0	10.0	50

Subject objectives

The aim of the course **"Introduction to Statistics in Natural Sciences"** is to familiarize students with the basic concepts, methods, and statistical tools, including creating own tools, used in data analysis in the natural sciences. The course aims to develop logical thinking skills, the ability to interpret statistical results, and the critical evaluation of experimental data. Students will learn how to formulate hypotheses, select appropriate statistical methods, conduct analyses, and draw conclusions based on empirical data. Particular emphasis is placed on the practical application of statistics in research in the field of chemistry.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W06] Applies mathematics to the extent necessary to understand, describe and model chemical processes of medium complexity.	Is able to select an appropriate statistical test for a given problem.	[SW5] implementation of a problem task
[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	Is able to apply advanced statistical tests to evaluate results.	[SU2] presentation/project/paper/ report
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Understands the complexity and breadth of available statistical analyses and is able to seek out appropriate tools.	[SK5] implementation of a problem task
[CHEMMU2_K06] Undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it.	Understands the complexity and breadth of available statistical analyses and is able to seek out appropriate tools.	[SK5] implementation of a problem task
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Is able to write their own programs to perform statistical tests.	[SW2] presentation/project/paper/ report

<table>
<tr><td>Subject contents</td><td>An introduction to statistics covering the role of statistics in the natural sciences and basic concepts such as types of data and measurement scales. Next, students become familiar with key statistical concepts including population, sample, parameters, data variability, and measurement errors. The following stage is descriptive data analysis, including measures of central tendency (mean, median, mode), measures of dispersion (range, variance, standard deviation), and basic methods of data visualization such as histograms.

Study of probability distributions, with particular emphasis on the normal distribution and binomial distribution. Students learn methods of parameter estimation.

Statistical hypothesis testing, where the formulation of null and alternative hypotheses, significance level, and interpretation of p-values are discussed. Students learn to apply basic statistical tests such as the Students t-test for different types of samples, non-parametric tests, and the chi-square test.

Analysis of variance (ANOVA) both one-way and factorial, along with post hoc tests. Students learn methods of correlation analysis, including Pearsons and Spearmans correlation, as well as simple and multiple linear regression, along with verification of model assumptions. The course includes elements of statistical programming using R or Python, where students learn to write simple scripts for data analysis.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>- written report for each assigned project</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>-completion of all assigned projects during classes in the computer lab</td><td>51.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Practical statistics for data scientist Peter Bruce and Andrew Bruce

Introduction to Statistics David M. Lane</td></tr>
<tr><td>Supplementary literature</td><td>Information Theory and Statistics S. Kullback</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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