GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	CHEMOMETRY AND METHODOLOGY OF EXPERIMENTAL RESEARCH, PG_00063460		
Field of study	Biotechnology		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research 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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Pharmaceutical Technology And Biochemistry -> Faculty Of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Tomasz Laskowski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

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	45	10.0	20.0	75

Subject objectives

The aim of this course is to familiarize Student with the methodological principles of experimental work, optimal experimental planning and data processing, using both statistical and chemometric approach.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U05] proposes solutions to technological and scientific problems in biotechnology and related fields using experimental methods and bioinformatics, statistics and specialized databases	The student is able to formulate a problem for a given dataset and subsequently solve it using appropriately selected statistical and chemometric techniques.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K7_W04] selects methods of data analysis, including bioinformatics, statistical and molecular modeling, useful for solving technological and scientific problems in biotechnology and related fields	The student is able to apply various chemometric and statistical techniques depending on the quality of the data and the nature of the problem.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_K03] understands the social role and importance of providing reliable information and opinions to the public	The student learns basic and advanced statistical and chemometric methods and understands when to apply each approach.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice

<table>
<tr><td>Subject contents</td><td>1. Introduction to chemometrics and methodology of experimental work. Basics of both and the differences between statistical and chemometric approach.
2. Archivization and data control.
3. Analysis of single variables. Statistical probe vs. general population. Variables' distribution.
4. Graphical representation of the distributions. Histogram, quantum plot.
5. Statistical tests: outliers and errors.
6. Parametric and non-parametric comparison of general populations. Variance analysis.
7. Variables in pairs. Correlation & determination coefficients. Entropy of a distribution. Dependency linearization.
8. Introduction to chemometric approach: specific transformations of the variables.
9. Exploratory analysis: analysis of similarities. Distance matrices. Cluster analysis.
10. Exploratory analysis: factorial analysis. Information. Principal component analysis.
11. When chemometrics meets statistics: dependence modelling. Linear regression, statistical relevancy and quality of chemometric models.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>• Advanced usage of a spreadsheet.
• Basic Python programming.
• Basic statistics.</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>exam</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>project</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>reports from laboratory classes</td><td>60.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>• Chemometria praktyczna, Jan Mazerski, Wydawnictwo Malamut.
• Statystyczna analiza wyników doświadczalnych, Jan Mazerski, Wydawnictwo Politechniki Gdańskiej.</td></tr>
<tr><td>Supplementary literature</td><td>-</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>A Student has to prepare a dataset, state a problem for these data and solve the problem, using properly selected chemometric and statistical techniques.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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