

Subject card

Subject name and code	Statistics and Chemometrics in Chemical Analytics, PG_00188283						
Field of study	Statystyka i chemometria w analityce chemicznej (Ćw.audytoryjne)						
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 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		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Karolina Jagiełło				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	Teaching students how to perform basic and advanced statistical calculations and tests, with particular emphasis on selecting the appropriate statistical methods for the specific problems encountered in forensic analysis.						
	Familiarization of students with available software implementing statistical methods and preparation of students for the independent use of these tools in analytical work and forensic research.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_U03] The graduate is able to perform analyses using instrumental methods (spectroscopy, chromatography, microbiological tests) and interpret research results.	Student: is able to statistically process research results obtained using instrumental methods such as chromatography, spectroscopy, or microbiological analyses - calculates descriptive statistics, assesses repeatability, and identifies outliers. is able to apply appropriate statistical tests to assess the significance of differences and the consistency of measurement results obtained using instrumental techniques. interprets numerical and graphical data generated by analytical equipment using statistical methods, formulating correct and unambiguous conclusions.	[SU2] prezentacja/projekt/referat/raport
	[AKRL3_K04] The graduate is ready to cooperate with representatives of other fields—law, medicine, biology—within forensic expertise.	Student: is ready to cooperate with representatives of other fields, is able to present the results of statistical analyses in a clear and comprehensible manner so that they can be interpreted by specialists in the fields of law, medicine, or biology in the context of court expert opinions. understands the importance of joint data interpretation and is able to communicate the limitations and reliability of statistical results in a way that enables effective teamwork in advisory processes.	[SK2] prezentacja/projekt/referat/raport
	[AKRL3_W08] The graduate knows and understands the application of information technologies in data analysis, interpretation of results, and reporting of forensic research.	knows and understands the use of basic IT tools (e.g., spreadsheets) for processing measurement data used in forensic analysis. knows the principles of digital statistical data analysis, including the calculation of descriptive statistics, the creation of histograms, graphs, and other forms of graphical presentation of results.	[SW2] prezentacja/projekt/referat/raport
	[AKRL3_U05] The graduate is able to apply statistical and chemometric methods to analyse and interpret measurement results.	Student: is able to apply basic statistical methods to analyze measurement results, including calculating descriptive statistics (mean, standard deviation, variance, quartiles) and interpreting their significance in the context of forensic investigations. is able to perform statistical tests (including Student's t-test, Mann-Whitney U test, χ^2) and use them to draw correct conclusions about measurement data. is able to analyze data distributions, identify outliers, and assess the compliance of data with a statistical model relevant to the interpretation of evidence.	[SU2] prezentacja/projekt/referat/raport

Subject contents	Fundamentals of chemical metrology and documentation of results in forensic investigations: history and essence of measurements in the context of trace analysis; the role of standards and calibration in forensic laboratories; measurement scales, significant digits, and rules for rounding numbers; requirements for reliable documentation of measurement results for evidentiary proceedings; potential consequences of errors in documentation for the evaluation of evidence. Basics of statistical description in the analysis of evidence: general population vs. forensic samples; characteristics of series of results from chemical and physicochemical trace analysis; measures of central tendency and data dispersion; basic statistical distributions used in the interpretation of results; descriptive statistics and their importance for the assessment of the reliability of results; distribution series, histograms, and identification of outliers in forensic data; testing statistical hypotheses using parametric and non-parametric tests; correlation analysis in comparative studies.		
Prerequisites and co-requisites	General chemistry, mathematics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	egzam	51.0%	100.0%
Recommended reading	Basic literature	<i>A. Łomnicki: Wprowadzenie do statystyki dla przyrodników.</i> <i>Wydawnictwo Naukowe PWN, Warszawa 2003. J. Mazerski: Podstawy chemometrii. Gdańsk: Wydawnictwo Politechniki Gdańskiej, 2000 P.</i> <i>Konieczka, J. Namieśnik i in.: Ocena i kontrola jakości wyników analitycznych. Centrum Doskonałości Analityki i Monitoringu Środowiskowego, Gdańsk 2004.</i>	
	Supplementary literature	Scientific publikaction	
	eResources addresses		
	Example issues/ example questions/ tasks being completed		
Work placement	Not applicable		

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