

Subject card

Subject name and code	Mathematics, PG_00188257						
Field of study	Matematyka (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	
Mode of study	full-time studies		Mode of delivery			at the university	
Year of study	1		Language of instruction			Polish polish	
Semester of study	1		ECTS credits			2.0	
Learning profile	academic		Assessment form			credit	
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Elżbieta Mrożek				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	30.0	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		5.0		15.0	50
Subject objectives	The aim of the course is to familiarize the student with the basic concepts of higher mathematics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_W06] The graduate knows and understands the principles of statistical processing of measurement data and the basics of chemometrics and validation of analytical methods.	The student selects techniques of higher mathematics to the extent necessary to understand and describe chemical processes and physical processes important for understanding chemistry;	[SW1] wypowiedź ustna/rozmowa/diskusja
	[AKRL3_U05] The graduate is able to apply statistical and chemometric methods to analyse and interpret measurement results.	The student is able to use statistical methods to develop, analyze and interpret measurement results used in forensic analytics.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny [SU8] obserwacja samodzielnej lub zespołowej pracy studenta
	[AKRL3_U06] The graduate is able to use specialised software and advanced ICT techniques to develop and visualise experimental data.	The student is able to use computational tools and mathematical software to process, quantitatively analyze and visualize experimental data, in particular to perform statistical calculations, mathematical modeling and present results in the form of readable graphs and reports.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny [SU8] obserwacja samodzielnej lub zespołowej pracy studenta
	[AKRL3_U10] The graduate is able to interpret data from different analytical techniques to reconstruct events or identify evidence material.	The student is able to apply mathematical and statistical methods to analyze and interpret data from various analytical techniques, in particular by modeling relationships, assessing probabilities, and drawing conclusions needed to reconstruct the course of events or identify evidence.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny [SU8] obserwacja samodzielnej lub zespołowej pracy studenta
	[AKRL3_K02] The graduate is ready to make reliable, objective decisions and take responsibility for the interpretation of research results.	The student is able to interpret the results of mathematical calculations and statistical analyses in a responsible and objective manner, understanding their limitations, potential for errors and impact on decision-making in the forensic analysis process.	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[AKRL3_W01] The graduate knows and understands, at an advanced level, the laws and theories in the field of chemistry, as well as the basics of biology, mathematics and law constituting general knowledge in the scientific disciplines forming the theoretical foundations relevant to the study program.	The student has knowledge of mathematics, including linear algebra with geometry, probability and statistics.	[SW4] test/egzamin - ustny lub pisemny

Subject contents	1. Introduction to Mathematics in Data Analysis -The importance of mathematical methods in forensic analysis. -Basic data types and their numerical representation. 2. Basics of Linear Algebra -The concepts of vectors and vector spaces. -Matrices: types, structure, and representation of multidimensional data. -Basic matrix operations: addition, multiplication, determinant, and inverse matrix. -Applications of Linear Algebra in Forensic Analysis 3. Systems of Linear Equations - Methods for solving systems of equations: - substitution method, - Gaussian elimination method, - using matrices and matrix inverses. -Interpreting Systems of Equations in Phenomena Modeling 4. Probability Theory -Random Events and the Event Space -Principles of Calculating Probability Conditional -Probability and Independence of Events -Simple Probabilistic Models Applications in Forensic Science 5. Correlation and Regression -Correlation Coefficient: Interpretation, Range, and Limitations -Linear Relationships Between Variables -Linear Regression -Applications in Forensic Science
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	activity	51.0%	20.0%
	test	51.0%	80.0%
Recommended reading	Basic literature	1. Teresa Jurlewicz, Zbigniew Skoczylas: "Linear Algebra 1 Examples and Problems," GiS Publishing House, Wrocław 2000. 2. M. Gewert, Z. Skoczylas: "Introduction to Analysis and Algebra," GiS Publishing House 2011. 3. N. Józefacka, M. Kołek, A. Arciszewska-Leszczuk, Methodology and Statistics. A Guide for the Scientific Tourist, PWN Scientific Publishing House, Warsaw 2023. 4. J. Jakubowski, R. Sztencel, Introduction to Probability, SCRIPT, 2010. 5. H. Jasiulewicz, W., Probability Calculus and Mathematical Statistics, GiS Publishing House.	
	Supplementary literature	not aviable	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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