

Subject card

Subject name and code	Metrological Data Analysis, PG_00172744						
Field of study	Mathematical Modeling and Data Analysis						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish Polish		
Semester of study	2		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Division of Atomic and Molecular Physics -> Institute of Experimental Physics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Marek Józefowicz				
	Teachers		dr Łukasz Sobolewski dr hab. Marek Józefowicz				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	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	60		10.0		80.0	150
Subject objectives	The aim of the course is to familiarize the student with the basics of the methods of measurement data processing and measurement error analysis in experimental science, to acquire the ability to correctly process and present the results of experimental measurements.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MMiADL3_K02] is ready to precisely formulate questions to deepen his/her own understanding of a given topic or to find missing elements of reasoning	The student is able to solve problems using probability theory and statistical methods.	[SK4] test/exam - oral or written [SK5] implementation of a problem task
	[MMiADL3_W08] knows and understands well the role and importance of proof in mathematics, as well as the concept of the significance of assumptions	The student knows the basic principles of measurement error analysis.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
	[MMiADL3_U07] can comprehensively, in speech and in writing, formulate definitions and theorems and present correct mathematical reasoning regarding the issues learned	The student is able to perform quantitative analyses and formulate qualitative conclusions on this basis.	[SU4] test/exam - oral or written [SU5] implementation of a problem task
	[MMiADL3_U08] is able to plan a way to solve a given problem and make a correct record of this solution, providing accurate and precise justifications for the correctness of their reasoning	The student is able to formulate research problems in terms of probability and statistics.	[SU4] test/exam - oral or written [SU5] implementation of a problem task
Subject contents	1. Mean value and standard uncertainty (deviation) of a series of direct measurements. 2. Standard uncertainty of the arithmetic mean 3. Mean value of a series of independent and dependent indirect measurements. 4. Combined standard uncertainty of a series of independent indirect measurements. 5. Combined standard uncertainty of a series of dependent indirect measurements. 6. Standard uncertainty (standard deviation) of the mean of a series of independent indirect measurements. 7. Assessment of maximum uncertainty in indirect measurements the method of total differential 8. Assessment of maximum uncertainty in indirect measurements the method of logarithmic derivative 9. Linear regression method (fitting a linear function to experimental results). 10. Histogram and distribution of a discrete random variable (distribution mean, variance, cumulative distribution function). 11. Histogram and distribution of a continuous random variable (distribution mean, variance, cumulative distribution function). 12. Normal (Gaussian) distribution (distribution mean, variance, cumulative distribution function). 13. Standardized Normal Distribution (distribution mean, variance, cumulative distribution). 14. t- Student distribution 15. Binomial (Bernulli) and Poisson distribution		
Prerequisites and co-requisites	Knowledge of Mathematical Analysis I		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	colloquium	51.0%	40.0%
	exam	51.0%	60.0%
Recommended reading	Basic literature	J.R. Taylor - Introduction to Error Analysis, Second Edition: The Study of Uncertainties in Physical Measurements	
	Supplementary literature	M.G. Kendall, A. Stuard -The advanced theory of statistics	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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