University of Gdańsk

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 2025	Academic year of realisation of subject	2025/2026
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
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		

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_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_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
[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_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

<table>
<tr><td>Subject contents</td><td>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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of Mathematical Analysis I</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>51.0%</td><td>60.0%</td></tr>
<tr><td>colloquium</td><td>51.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>J.R. Taylor - Introduction to Error Analysis, Second Edition: The Study of Uncertainties in Physical Measurements</td></tr>
<tr><td>Supplementary literature</td><td>N/A</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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