GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to the experiment, PG_00072324		
Field of study	Nanotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-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	blended-learning
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Barbara Kościelska	
	Teachers	dr inż. Szymon Winczewski prof. dr hab. inż. Barbara Kościelska mgr inż. Joanna Pośpiech	

Lesson types

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

E-learning hours included: 2.0

eNauczanie source addresses:

Moodle ID: 7395 Wprowadzenie do eksperymentu
https://enauczanie.pg.edu.pl/2025/course/view.php?id=7395

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	5.0	50.0	100

Subject objectives

1. Acquisition of the ability to describe the problem, plan an experiment leading to a solution to the problem, evaluate the results of the experiment.

2. The course also includes a computer laboratory, which will focus on learning computer tools (mainly the gnuplot program) useful in engineering practice and in the analysis and presentation of scientific data.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W06] possesses advanced knowledge of the principles of experiment planning, experimental methods, measurement techniques, and equipment used in nanotechnology and related sciences, and understands the processes occurring throughout their life cycle.	The student possesses advanced knowledge of experimental design and is able to analyze measurement uncertainty and present measurement results.	[SW2] Assessment of knowledge contained in presentation
	[K6_U03] has programming skills in a selected programming language and is able to use selected software packages.	The student is able to use the Gnuplot program.	[SU1] Assessment of task fulfilment
	[K6_U04] is able to independently or in a team plan and conduct experiments in nanotechnology and related disciplines, including physics, materials engineering, and chemistry, as well as analyze and interpret the obtained results and formulate conclusions.	The student is able to plan and conduct simple physics experiments and present the results in a report.	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task
	[K6_K03] is prepared to responsibly perform professional roles, adhere to ethical principles, and ensure workplace safety.	The student understands the ethical principles involved in planning an experiment and presenting its results.	[SK3] Assessment of ability to organize work

Subject contents	Course content – lecture **Lecture** 1. Sources of scientific and non-scientific knowledge. 2. Measurement errors and uncertainties. 3. Statistical distribution of measurements. 4. Measurements and measurement uncertainties of complex quantities. 5. Graphical and tabular presentation of measurement results. 6. Determination of physical parameters from graphs. Linear regression method. 7. Planning simple physical experiments. 8. Principles of presenting measurement results. Creating a report. 9. Principles of preparing scientific publications. 10. Errors and fraud in science.
	Course content – exercises 1. Measurement errors and uncertainties. 2. Statistical distribution of measurements. 3. Measurements and measurement uncertainties of complex quantities. 4. Graphical and tabular presentation of measurement results. 5. Determination of physical parameters from graphs. Linear regression method. 6. Planning simple physical experiments. 7. Principles of presenting measurement results. Creating a report.
	Course content – laboratory 1. The gnuplot program – characteristics and applications. 2. Working with gnuplot – interactive and batch modes. 3. Basic gnuplot commands (set, show, plot). 4. Creating 2D plots.

	5. Functions, variables, and arithmetic operations. 6. Handling data files. 7. Exporting plots to graphic files. 8. Linear regression. 9. Statistical analysis. 10. Fitting functions to data.
Prerequisites and co-requisites	Knowledge of mathematics and physics at secondary school level.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory - passing all laboratory exercises.	50.0%	40.0%
Lecture and exercises - designing and performing the experiment and writing the report	50.0%	60.0%

Recommended reading

Basic literature	1. B. Kusz, Metody wykonywania pomiarów oraz szacowanie niepewności pomiaru (https://pg.edu.pl/files/ftims/2021-03/wstep.pdf) 2. K. Kozłowski, R. Zieliński I Laboratorium z Fizyki część I, Wydawnictwo PG. 3. Dudkiewicz J, Kusz B, Laboratorium z Fizyki, część 2, Wydawnictwo PG. 3. John R. Taylor, Wstęp do analizy błędu pomiarowego, Wydawnictwo PWN 4. T. Williams, C. Kelley, "gnuplot 5.4: An Interactive Plotting Program", http://www.gnuplot.info/docs_5.4/Gnuplot_5_4.pdf gnuplot homepage, http://gnuplot.info/
Supplementary literature	1. Les Kirkup, Experimental Methods for Science and Engineering Students: An Introduction to the Analysis and Presentation of Data, 2nd ed., Cambridge University Press.
eResources addresses	

Example issues/ example questions/ tasks being completed

Lecture/exercises

1. Plan an experiment to prove the following thesis: ....

2. Draw a graph based on tabular data. Describe the chart as fully as possible.

Computer laboratory

1. Processing and presenting provided scientific data using the gnuplot program.

2. Fitting a theoretical curve (a function with a given parametric form) to the provided scientific dat.

Practical activites within the subject	Not applicable