GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to the experiment, PG_00063334		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute Of Nanotechnology And Materials Engineering -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Barbara Kościelska	
	Teachers	prof. dr hab. inż. Barbara Kościelska dr inż. Szymon Winczewski	

Lesson types and methods of instruction

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: 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	45	5.0	25.0	75

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_W09] Has knowledge of the structure and operation of scientific instruments, measuring and test equipment and in the field of planning and conducting a physical experiment and critical analysis of its results.	Knowledge of the construction and operation of simple physical devices. Ability to plan and conduct a simple physical experiment and present and analyze its results.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_K04] can cooperate and work in a team, adopting different roles.	The student knows how to work in a team.	[SK1] Assessment of group work skills
[K6_U10] can forecast and assess potential negative biological and ecological effects of producing nanostructures on an industrial scale and their practical application.	On the example of nanotechnology, the student is able to critically assess the risks associated with new technologies	[SU2] Assessment of ability to analyse information
[K6_U04] can plan and conduct experiments, critically analyze their results, draw conclusions and formulate opinions. Has laboratory experience.	The student is able to plan and carry out experiments, critically analyze their results.	[SU2] Assessment of ability to analyse information

Subject contents	**Lecture/exercises** 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. **Laboratory (computer laboratory)** 1. Gnuplot program - characteristics and applications. 2. Working with the gnuplot program - interactive and batch modes. 3. Basic gnuplot commands (set, show, plot). 4. Creating 2D plots. 5. Functions, variables, 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 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%	35.0%
Lecture and exercises - designing and performing the experiment and writing the report	50.0%	65.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>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. 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/</td></tr>
<tr><td>Supplementary literature</td><td>none</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Wprowadzenie do eksperymentu - Moodle ID: 39675
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39675</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">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.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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