



Subject card

Subject name and code	Planning and analysis of experiment, PG_00060211						
Field of study	Planowanie i analiza eksperymentu						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
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	Division of Electron Collisions Physics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Paweł Możejko				
	Teachers		dr inż. Michał Piłat dr hab. Paweł Możejko				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 2565 Planowanie i analiza eksperymentu https://enauczanie.pg.edu.pl/2025/course/view.php?id=2565						
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		40.0	75
Subject objectives	The aim of the course is to present the measurements procedures of physical quantities and the analysis of statistical and systematic uncertainties.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] plans and conduct experiments, critically analyzes their results, draw conclusions and forms opinions, has laboratory work experience		Practical knowledge of statistical distributions and their application in the error analysis.		[SU4] Ocena umiejętności korzystania z metod i narzędzi		
	[K6_W08] has knowledge of planning and conducting physical experiments, and critical analysis of its results		Ability to calculate the experimental errors in indirect measurements.		[SW1] Ocena wiedzy faktograficznej		

Subject contents	<p>Course content – lecture</p> <p>1.) Experimental results and their uncertainties (1 hr.)</p> <p>2.) Propagation of uncertainties (1 hr.)</p> <p>3.) Statistical analysis of random uncertainties (1 hr.)</p> <p>4.) The normal distribution (1 hr.)</p> <p>5.) The standard deviation, standard deviation of the mean and the normal distribution (1 hr.)</p> <p>6.) Weighted averages (1 hr.)</p> <p>7.) Least-squares fitting (1 hr.)</p> <p>8.) The covariance and correlation (1 hr.)</p> <p>9.) The binomial distribution, the Poisson distribution (1 hr.)</p> <p>10.) χ^2 test (1 hr.)</p> <p>11.) t-Student distribution (1 hour)</p> <p>12.) Graphical presentation of the results of measurements (1 hr.)</p> <p>13.) Basic measuring instruments (caliper, micrometer, etc..) (1 hr.)</p> <p>14.) Measurements of the basic physical quantities (1 hr.)</p> <p>15.) Planning of the experiment (1 hr.)</p>		
Prerequisites and co-requisites	<p>Knowledge and of the basic algebraic operations</p> <p>Knowledge of the basic elementary functions of one variable</p> <p>Ability to think analytically</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	50.0%
	Midterm colloquium	60.0%	50.0%
Recommended reading	Basic literature	<p>J.R. Taylor "Wstęp do analizy błęd pomiarowych", PWN, Warszawa 2012</p> <p>Andrzej Zięba "Analiza danych w naukach ścisłych i technice", PWN, Warszawa 2014</p> <p>S. Brandt "Analiza danych", PWN, Warszawa 2002</p> <p>H. Szydłowski "Teoria Pomiarów", PWN, Warszawa 1981</p> <p>H. Szydłowski "Pracownia Fizyczna", PWN, Warszawa 1999</p>	
	Supplementary literature	K. Kozłowski, R. Zieliński "I Laboratorium z Fizyki", Wydawnictwo PG, Gdańsk 2003	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1) Calculation of the arithmetic mean, standard deviation and standard deviation of the mean 2) Graphical presentation of the measured data 3) Calculation of measurement error using the combined standard uncertainty method 4) Calculation of weighted average 5) The analysis of statistical data with the normal distribution 6) Linear function fit to the measured data 7) Calculation of the linear regression coefficient and its analysis 8) Implementation of simple measurements using a calliper and a micrometer
Practical activities within the subject	Not applicable

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