

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Planning and analysis of experiment, PG_00060211								
Field of study	Technical Physics								
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	Polish		
Semester of study	1		ECTS credits		3.0				
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład Fizyki Zderzeń Elektronowych -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics								
Name and surname	Subject supervisor		dr hab. Paweł Możejko						
of lecturer (lecturers)	Teachers		mgr inż. Michał Piłat						
			prof. dr hab. Anna Perelomova						
			dr hab. Paweł Możejko						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	;t	Seminar	SUM	
of instruction	Number of study hours	15.0	15.0	0.0	0.0		0.0	30	
	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	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_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] Assessment of factual knowledge			
	[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] Assessment of ability to use methods and tools			

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

Example issues/ example questions/ tasks being completed	 Calculation of the arithmetic mean, standard deviation and standard deviation of the mean 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
	b) Linear function int to the measured data
	7) Calculation of the linear regression coefficeint and its analysis
	8) Implementation of simple measurements using a calliper and a micrometer
Work placement	Not applicable

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