



Subject card

Subject name and code	Planning and analysis of experiment, PG_00060211						
Field of study	Technical Physics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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	Zakład Fizyki Zderzeń Elektronowych -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Paweł Możejko					
	Teachers	mgr inż. Michał Jurkowski mgr inż. Natalia Tańska dr hab. Paweł Możejko					
Lesson types and methods of instruction	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						
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] Can plan and conduct experiments, critically analyze their results, draw conclusions and form 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		
	[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		

Subject contents	<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	<table border="1"> <thead> <tr> <th data-bbox="451 1402 794 1435">Subject passing criteria</th> <th data-bbox="794 1402 1142 1435">Passing threshold</th> <th data-bbox="1142 1402 1487 1435">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 1435 794 1469"></td> <td data-bbox="794 1435 1142 1469">60.0%</td> <td data-bbox="1142 1435 1487 1469">50.0%</td> </tr> <tr> <td data-bbox="451 1469 794 1503">Midterm colloquium</td> <td data-bbox="794 1469 1142 1503">60.0%</td> <td data-bbox="1142 1469 1487 1503">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		60.0%	50.0%	Midterm colloquium	60.0%	50.0%
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<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 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
<p>Work placement</p>	<p>Not applicable</p>