GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Laboratory of electron collisions physics, PG_00064469		
Field of study	Technical Physics		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group 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	2	Language of instruction	Polish Polish
Semester of study	3	ECTS credits	2.0
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	dr hab. Paweł Możejko	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	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	0.0	0.0	30

Subject objectives

The aim of the course is to master experimental techniques used to study interactions of low-energy electrons with matter.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W05] Knows the theoretical basis of the functioning of physical scientific equipment.	Knowledge of vacuum physics and techniques. Knowledge of methods for measuring quantities characterizing the process of electron scattering on atoms and molecules.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_U03] Has enhanced laboratory work experience.	Ability to operate a vacuum system in the ultra-high vacuum range. Ability to measure electron beam intensities in the order of pA. Ability to tune an electrostatic electron spectrometer. Ability to measure very low gas pressures.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K7_W06] Has enhanced knowledge of the experimental methods and techniques applied in physics.	Knowledge of experimental techniques in the field of electron collision physics.	[SW1] Assessment of factual knowledge
[K7_U06] Can apply obtained knowledge of physics to exact sciences, natural and technical sciences.	Ability to design components of equipment used to measure total electron scattering cross-sections. Ability to interpret the results of an experiment on electron scattering from gas molecular targets..	[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	1) UHV generation 2) Operation of the vacuum station and monitoring its condition 3) Methods of generating electron beams 4) Cylindrical electrostatic electron spectrometer - Working principles, operation and control 5) Measurement of low currents 6) Measurement of very low pressures 7) Software for measurement and control of the experiment in which the total cross-sections are measured 8) The influence of a resonance on scattering processes 9) Investigation of the correlation between the physico-chemical parameters of the target and the electron scattering cross-sections 10) Automation of measurement processes 11) Analysis of statistical and systematic uncertainties in scattering experiments
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
30 / 5 000 Assessment - written or oral	60.0%	40.0%
results analysis	60.0%	30.0%
work in laboratory	60.0%	30.0%

Recommended reading

Basic literature	"Gaseous Electronics Theory and Practice"Gorur Govinda Raju, CRC Press, Boca Raton 2019
Supplementary literature	"Gaseous Electronics Tables, Atoms, and Molecules" Gorur Govinda Raju, CRC Press, Boca Raton 2012
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Assumptions of linear transmission method. Basics of operation of the three-electrode asymmetric electrostatic lens.
Work placement	Not applicable