GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Collision Spectroscopy, PG_00053323		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Physics of Electronic Phenomena -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Ireneusz Linert	
	Teachers	dr inż. Ireneusz Linert	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	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	50.0	100

Subject objectives	Gaining knowledge and skills in the field of electron and ion collision spectroscopy and photoionization

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	The student learns the laws and physical phenomena related to the interaction of charged particles (electrons, positrons, ions) and photons with matter.	[SW1] Assessment of factual knowledge
[K7_U08] while identifying and formulating engineering tasks specifications and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering workn	The student is able to design spectrometric devices.	[SU1] Assessment of task fulfilment
[K7_U02] can perform tasks related to the field of study as well as formulate and solve problems applying recent knowledge of physics and other areas of science	The student learns the experimental methods of collision spectroscopy. Knowledge acquired can be applied to solving new problems.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K7_K01] is ready to create and develop models of proper behaviour in the work and life environment; undertake initiatives; critically evaluate actions of their own, teams and organisations they are part of; lead a group and take responsibility for its actions; responsibly perform professional roles taking into account changing social needs, including:n - developing the achievements of the profession,n- observing and developing rules of professional ethics and acting to comply to these rulesn	The student presents the results of the project.	[SK2] Assessment of progress of work

Subject contents

1.Electron collision spectroscopy 1.1 Electronic collision processes 1.2 Cross section 1.3. Interaction potential 1.4. Electron beam sources 1.5. Positron beam sources 1.6 Electron selectors and spectrometers 1.7 Electron elastic collisions 1.8 Inelastic collisions of electrons 1.9 Collisions of positrons. 1.10 Ionization spectroscopy 1.11 Electron capture spectroscopy 2. Ion collision spectroscopy. 2.1 Ionic collision processes 2.2 Sources of ion beams 2.3 Methods of detection of atoms and ions 3. Photoelectron spectroscopy. 3.1. Fundamentals of photoelectron spectroscopy 3.2. Absorption and photoionization processes. 3.3. Synchrotron radiation 3.4. Construction of experimental setups3.5. Photoelectron spectrometers

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture	50.0%	50.0%
laboratory	80.0%	30.0%
project	80.0%	20.0%

Recommended reading

Basic literature	1. A. Oleś, Metody eksperymentalne fizyki ciała stałego: leptony i fotony. WNT 1993. 2. H. Massey, Atomic and molecular collisions.
Supplementary literature	E.W. McDaniel, Atomic Collisions.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Principle of operation and construction of an electron spectrometer, properties of electrostatic lenses, source positrons

Work placement

Not applicable