GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to physics of atom and atomic nucleus, PG_00047937						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	first-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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Katedra Fizyki Atomowej, Molekularnej i Optycznej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Mateusz Zawadzki				
	Teachers						

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60	4.0	36.0	100

Subject objectives	Lectures and seminars are designed to present concepts , selected mathematical methods and experimental physics of atoms and molecules.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Student knows the basic issues in the field of atomic and particle physics. Student solves physical problems and applies known quantum calculation methods, and analyzes and interprets the results of calculations.	[SW1] Assessment of factual knowledge
	[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	Student can describe physical phenomena necessary to solve specific biomedical problems. The student describes important experiences in atomic and molecular physics and interprets their results.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information

Subject contents	1. Quantum properties of radiation 2. Experimental evidence of the quantum nature of radiation 3. Wave properties of particles of material 4. Schrodinger equation 5. Structure of the atom 6. The angular momentum of the atom 7. Construction of electron shells 8. Atom in a magnetic field: linear and quadratic Zeeman effect 9. X-ray 10. Atomic Optics

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab reports	100.0%	20.0%
	Exam	50.0%	40.0%
	Tutorial - tests	40.0%	40.0%
Recommended reading	Basic literature	1. B.H. Bransden, C.J. Joachain, Physics of atoms and molecules, Longman, 1983 2. R. Resnick, D. Halliday, and J. Walker, Fundamentals of Physics, 7th ed., John Wiley & Sons, 2005	
	Supplementary literature	1. H. Haken, H.Ch. Wolf, Atomic and quantum physics: an introduction to the fundamentals of experiment and theory, Spronger-Verlag, 1984	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Derivation of Schrödinger equation. Populating the electron orbitals. Drawing diagrams of energy for the atom in presence of the magnetic field . Reflection of a particle from the potential barrier at the specified boundary conditions . Calculating the reflectance and transmission coefficients for particles encountering a barrier potential.		
Work placement	Not applicable		

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