



Subject card

Subject name and code	Introduction to Modern Physics, PG_00069207						
Field of study	Wprowadzenie do fizyki współczesnej						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2025/2026		
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	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Piłat				
	Teachers		dr inż. Michał Piłat				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The aim of the course is to present the foundations of modern physics: basics of theory of relativity and quantum mechanics based on Schrödinger equation. During the course main ideas and formulas originated from the theory of relativity and basic models of quantum mechanics will be presented which are often used in other, more advanced, problems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U08		Student can write a short essay about a topic presented on a lecture.		[SU1] Ocena realizacji zadania		
	K6_W02		Student has the knowledge about the basics of theory of relativity and quantum mechanics with elements of atomic and nuclear theory.		[SW1] Ocena wiedzy faktograficznej		
	K6_U07		Student can present what were the biggest advancements of physics during first half of 20th century		[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania		
	K6_K05		Student can in few sentences explain a phenomenon, for which relativity or quantum mechanics is needed to describe.		[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce		
	K6_U10		Student can state their engagement about modern physics on the basis of presented facts.		[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu		

Subject contents	Course content – lecture		
	Special theory of relativity • Correspondence principle • Lorentz contraction • Time dilation • Equivalence of mass and energy • Space-time • general and Newton's law Quantum mechanics: • Causes of birth of quantum mechanics • Discovery of the electron, the atomic nucleus • Bohr's atom model • Schrödinger equation • Formalism of quantum mechanics • Particle in a box • Harmonic oscillator • Hydrogen atom • Atomic structure • Spin		
Prerequisites and co-requisites	Basics of mechanics and electrodynamics		
	Basics of calculus and linear algebra		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	-	50.0%	100.0%
Recommended reading	Basic literature	Essentials of modern physics/ V. Acosta, C. L. Cowan, B. J. Graham	
		Annus mirabilis papers /A. Einstein	
	Supplementary literature	Fundamentals of modern physics /R. S Eisberg	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Describe Bohr's atom model		
	Describe time dilation and Lorentz contraction		
	Describe atomic structure		
Practical activities within the subject	Not applicable		

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