



Subject card

Subject name and code	Fundamentals of modern physics, PG_00062728						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2027/2028	
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	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				4.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Division of Physics of Disordered Systems -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Winiarski					
	Teachers						
Lesson types	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		5.0		35.0	100
Subject objectives	The aim of the course is to familiarize students with the basic issues of modern physics.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_K01] is aware of the need to constantly update and enrich knowledge and practical skills, and improve professional, personal and social competences	The student is aware of the progress of science and technology and the resulting need to update and expand their knowledge and competences.			[SK3] Assessment of ability to organize work		
	[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems	The student formulates and solves engineering and technological problems based on the achievements of modern physics			[SW1] Assessment of factual knowledge		
	[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems	The student applies the laws of physics to solve theoretical, engineering and technological problems.			[SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Course content – lecture Older quantum theory: Planck's distribution; Einstein's law of photoemission; Bohr's model of the atom.</p> <p>Introduction to quantum physics: Basic assumptions of quantum physics; matter waves; Schrödinger's equation; Heisenberg's uncertainty principle; Elementary particles and their properties; particle statistics - fermions and bosons. Pauli's exclusion principle.</p> <p>Fundamentals of atomic and molecular physics: Atomic structure and the periodic table; Bonds; energetic rotational and vibrational states of molecules;</p> <p>Introduction to lasers: Spontaneous and stimulated emission; optical resonators; the principle of operation of the maser and laser; Basic types of lasers and their structure.</p> <p>Introduction to solid state physics: Bloch's theorem and energy bands in solids; semiconductors; Theses and results of Einstein's special and general theory of relativity.</p>											
Prerequisites and co-requisites	Course in Classical Physics and Mathematics											
Assessment methods and criteria	<table border="1" data-bbox="448 685 1487 786"> <thead> <tr> <th data-bbox="448 685 794 719">Subject passing criteria</th> <th data-bbox="794 685 1141 719">Passing threshold</th> <th data-bbox="1141 685 1487 719">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 719 794 752">exercise test</td> <td data-bbox="794 719 1141 752">50.0%</td> <td data-bbox="1141 719 1487 752">50.0%</td> </tr> <tr> <td data-bbox="448 752 794 786">test</td> <td data-bbox="794 752 1141 786">50.0%</td> <td data-bbox="1141 752 1487 786">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	exercise test	50.0%	50.0%	test	50.0%	50.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>Współczesna fizyka cząstek, M. Thomson, PWN, 2023</p> <p>given during lectures</p>										
Example issues/ example questions/ tasks being completed												
Practical activities within the subject	Not applicable											

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