



Subject card

Subject name and code	Modern Physics, PG_00047661						
Field of study	Informatics						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study 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	3	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Atomic Physics and Luminescence -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Sebastian Bielski				
	Teachers		dr inż. Sebastian Bielski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		3.0		42.0	75
Subject objectives	The aim of the subject is to provide students with the basic knowledge of physics helpful in further education.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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 solves simple problems of quantum mechanics and simple problems concerning electricity and magnetism.		[SU1] Assessment of task fulfilment		
	[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 lists and explains the basic physical phenomena, concepts, dependencies and laws concerning electromagnetism, theory of relativity and basics of quantum mechanics. Student solves simple problems of quantum mechanics and electromagnetics.		[SW1] Assessment of factual knowledge		

Subject contents	<p>Course content – lecture Lecture Electromagnetism. Electric field E. Electric potential. Gauss' law for electric field. Electric dipole. Lorentz force. Magnetic field B. Magnetic field of a moving charge. Biot-Savart law. Magnetic field of a straight wire. Magnetic force on a current carrying wire. Ampere's law. Interaction of two parallel long wires. Faraday's law. Maxwell's equations. Einstein's postulates. Lorentz transformation and its consequences. Polarization of light. Black body radiation. Photoelectric effect. Compton effect. Bohr model. Wave-particle duality. De Broglie hypothesis. Heisenberg uncertainty relations. Schrodinger's wave equation - examples of solutions (quantum well). Emission and absorption of light. Stimulated emission. Laser operation principle.</p> <p>Laboratory Performing a few experiments; conclusions, error analysis</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 537 794 577">Subject passing criteria</th> <th data-bbox="794 537 1137 577">Passing threshold</th> <th data-bbox="1137 537 1487 577">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 577 794 607">Lecture: final test</td> <td data-bbox="794 577 1137 607">50.0%</td> <td data-bbox="1137 577 1487 607">67.0%</td> </tr> <tr> <td data-bbox="451 607 794 645">laboratory: oral answers, reports</td> <td data-bbox="794 607 1137 645">50.0%</td> <td data-bbox="1137 607 1487 645">33.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture: final test	50.0%	67.0%	laboratory: oral answers, reports	50.0%	33.0%
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Lecture: final test	50.0%	67.0%										
laboratory: oral answers, reports	50.0%	33.0%										
Recommended reading	Basic literature	<ol style="list-style-type: none"> Halliday D., Resnick R., Walker J., Fundamentals of physics Openstax, University physics https://ftims.pg.edu.pl/strona-glowna/wydzial/laboratoria-wydzialowe/i-pracownia-fizyczna 										
	Supplementary literature	<ol style="list-style-type: none"> Sidney B. Cahn, Boris E. Nadgorny, and Paul D. Scholten, A Guide To Physics Problems. Jackson J. D., Classical Electrodynamics Griffiths D. J., Introduction to Electrodynamics 										
	eResources addresses											
Example issues/ example questions/ tasks being completed	<p>How does the maximum possible kinetic energy of electrons E_k depend on the incident light intensity I? We assume that the energy of each photon is greater than the work function.</p> <p>A) E_k does not depend on I B) E_k increases linearly with I C) E_k decreases linearly with I D) more information is needed</p> <p>According to the Gauss' law the electric flux through any closed surface S</p> <p>A) is always equal to zero B) depends only on the electric charges inside S C) depends only on the electric charges outside S D) depends on both the electric charges inside and outside S</p> <p>The inductance of a solenoid depends on (choose the right answer)</p> <p>A) cross-sectional area of the wire (or the diameter of the wire) and the length of the solenoid B) the length of the solenoid and the cross-sectional area of the solenoid C) the cross-sectional area of the solenoid and the current D) the current and the cross-sectional area of the wire</p> <p>Experiment: determine the moment of inertia of a given object.</p>											
Practical activities within the subject	Not applicable											

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