



Subject card

Subject name and code	Technical physics, PG_00045297						
Field of study	Data Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			English		
Semester of study	3	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sebastian Bielski					
	Teachers	dr inż. Sebastian Bielski dr inż. Damian Glowienka dr Mykola Shopa					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	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		8.0		72.0	125
Subject objectives	The aim of the course is to provide students with the basic knowledge of physics helpful in further education.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W17] has basic knowledge in the field of physics including basic laws of mechanics, geometrical optics, wave optics, nuclear and quantum physics, as well as fundamental assumptions and conclusions of the theory of special relativity	Student names and explains the basic physical phenomena, concepts and laws concerning electromagnetism, corpuscular and wave nature of light and the basics of quantum mechanics.			[SW1] Assessment of factual knowledge		
	[K6_U04] Performs measurements of physical quantities and estimates their uncertainty, solves tasks in the field of mechanics, thermodynamics, waves, optics and electricity.	Student solves simple problems of quantum mechanics and electromagnetics Ability to perform simple measurements of physical quantities and to prepare reports, including error analysis.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Lecture and tutorials</p> <p>Electromagnetism. The electric field. The magnetic field in vacuum. Electric and magnetic field of moving charge. Gauss' law. Biot-Savart law. Magnetic field around a wire. Lorentz force. Magnetic force on a current carrying wire. Ampere's law. Interaction of two parallel long wires. Faraday's law. Maxwell's equations. The polarization of light. The Black body radiation. The photoelectric effect. The Compton effect. The Bohr model. Wave-particle duality. De Broglie's hypothesis. Heisenberg's uncertainty principle. Schrodinger's wave equation - examples of solutions. Hydrogen atom and hydrogen-like ion. Spin of an electron. Emission and absorption of light. Stimulated emission. Laser operation principle.</p> <p>Laboratory</p> <p>Performing a few experiments; conclusions, error analysis</p>														
Prerequisites and co-requisites	No requirements														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 687 794 719">Subject passing criteria</th> <th data-bbox="799 687 1141 719">Passing threshold</th> <th data-bbox="1145 687 1490 719">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 725 794 757">laboratory: oral answer, report</td> <td data-bbox="799 725 1141 757">50.0%</td> <td data-bbox="1145 725 1490 757">33.0%</td> </tr> <tr> <td data-bbox="453 763 794 795">lecture: exam (test)</td> <td data-bbox="799 763 1141 795">50.0%</td> <td data-bbox="1145 763 1490 795">34.0%</td> </tr> <tr> <td data-bbox="453 801 794 833">tutorials: 2 tests</td> <td data-bbox="799 801 1141 833">50.0%</td> <td data-bbox="1145 801 1490 833">33.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory: oral answer, report	50.0%	33.0%	lecture: exam (test)	50.0%	34.0%	tutorials: 2 tests	50.0%	33.0%
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Recommended reading	Basic literature	<p>Halliday D., Resnick R., Walker J., Fundamentals of physics</p> <p>Griffiths D. J. , Introduction to Electrodynamics</p> <p>Jackson J. D., Classical Electrodynamics</p> <p>Bielski S., lecture notes and other materials published at the website: www.mif.pg.gda.pl/homepages/bolo</p> <p>Zubek M., Experiments in physics : first laboratory for students</p>													
	Supplementary literature	<p>Sidney B. Cahn, Boris E. Nadgorny, and Paul D. Scholten, A Guide To Physics Problems. Part 1: Mechanics, Relativity, and Electrodynamics</p> <p>Collection of physics problems available at the website: www.mif.pg.gda.pl/zz/</p>													
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Technical physics (Data Engineering)_22/23 - Moodle ID: 23579 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=23579</p>													
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>Find the electric field at a distance r from a uniformly charged plane.</p> <p>Experiment: determine the moment of inertia of a given object.</p>														

Work placement	Not applicable
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