



Subject card

Subject name and code	Technical physics, PG_00045297						
Field of study	Data Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
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	Division of Atomic, Molecular and Optical Physics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sebastian Bielski					
	Teachers	mgr Rengel Cane Sia Aoussaj Sbai dr inż. Sebastian Bielski 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 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		

Subject contents	<p>Lecture and tutorials</p> <p>Electromagnetism. Electric field. Magnetic field in vacuum. Electric and magnetic field of a 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. Black body radiation. Photoelectric effect. Compton effect. Bohr model. Wave-particle duality. De Broglies hypothesis. Heisenberg's uncertainty principle. Schrodinger's wave equation - examples of solutions. 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="456 667 794 696">Subject passing criteria</th> <th data-bbox="799 667 1137 696">Passing threshold</th> <th data-bbox="1142 667 1481 696">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 703 794 732">tutorials: 2 tests</td> <td data-bbox="799 703 1137 732">50.0%</td> <td data-bbox="1142 703 1481 732">33.0%</td> </tr> <tr> <td data-bbox="456 739 794 768">lecture: exam (test)</td> <td data-bbox="799 739 1137 768">50.0%</td> <td data-bbox="1142 739 1481 768">34.0%</td> </tr> <tr> <td data-bbox="456 775 794 804">laboratory: oral answer, report</td> <td data-bbox="799 775 1137 804">50.0%</td> <td data-bbox="1142 775 1481 804">33.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	tutorials: 2 tests	50.0%	33.0%	lecture: exam (test)	50.0%	34.0%	laboratory: oral answer, report	50.0%	33.0%
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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														