GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technical physics, PG_00045297		
Field of study	Data Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
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	

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_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.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[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

Subject contents

Lecutre and tutorials

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.

Laboratory

Perfoming a few experiments; conclusions, error analysis

Prerequisites and co-requisites	No requirements	
Assessment methods and criteria		

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%

Recommended reading	Basic literature	Halliday D., Resnick R., Walker J., Fundamentals of physics Griffiths D. J. , Introduction to Electrodynamics Jackson J. D., Classical Electrodynamics Bielski S., lecture notes and other materials published at the website: www.mif.pg.gda.pl/homepages/bolo Zubek M., Experiments in physics : first laboratory for students
	Supplementary literature	Sidney B. Cahn, Boris E. Nadgorny, and Paul D. Scholten, A Guide To Physics Problems. Part 1: Mechanics, Relativity, and Electrodynamics Collection of physics problems available at the website: www.mif.pg.gda.pl/zz/
	eResources addresses	
Example issues/ example questions/ tasks being completed	How does the maximum possible kinetic energy of electrons Ek depend on the incident light intensity I? We assume that the energy of each photon is greater than the work function. A) Ek does not depend on I B) Ek increases linearly with I C) Ek decreases linearly with I D) more information is needed According to the Gauss' law the electric flux through any closed surface S 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 The inductance of a solenoid depends on (choose the right answer) 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 Find the electric field at a distance r from a uniformly charged plane. Experiment: determine the moment of inertia of a given object.	
Work placement	Not applicable	