



Subject card

Subject name and code	Physics, PG_00069038						
Field of study	Chemical Technology						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Molecular Photophysics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Waldemar Stampor				
	Teachers		prof. dr hab. Józef Sienkiewicz dr hab. inż. Waldemar Stampor				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47732						
	Moodle ID: 47732 Fizyka dla chemików 2026/2027 sem 1 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47732						
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		10.0		45.0	100
Subject objectives	The aim of the course is to acquire specific knowledge in the field of general physics and to acquire appropriate skills to predict the course of physical phenomena based on known laws of physics, necessary to solve future engineering problems						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W01] Possesses knowledge of mathematics and physics necessary to analyze and describe technological processes, including differential and integral calculus, numerical methods, statistics and elements of vector analysis.		has the knowledge in the field of mechanics and electromagnetism defines basic concepts, gives definitions of physical quantities and explains physical laws.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_U01] Is able to independently plan the learning process and acquire, analyse and interpret information from various sources, also in English.		is able to correctly use physical formulas, distinguish scalar and vector quantities, apply basic physical laws, predict physical phenomena, solve problems in mechanics and electromagnetism, and critically evaluate information from various sources.		[SU2] Assessment of ability to analyse information		

Subject contents	Course content – lecture ABOUT PHYSICS. Physical quantities and their units . Elements of vector algebra . MECHANICS . Kinematics of a particle : rectilinear motion , curvilinear motion, Newton's laws of motion. Dynamics of rigid body : the moment of inertia, principal axes , Steiner's law, torque and angular momentum , equation of rotational motion, gyroscopes and precession. Conservation laws in mechanics . Oscillations and mechanical waves . Free, damped and forced vibrations. Mechanical resonance . Beats . Decomposition of periodic oscillations into the harmonic components . Types of waves. Equation of harmonic plane wave motion . Wave velocity . Examples of diffraction and interference of waves. Standing waves . Doppler effect. Sound intensity level . ELECTROMAGNETISM. Electric field . Coulomb's law . The intensity of the electric field . The electrical potential . The relationship between the intensity of the electric field and potential. An electric dipole and its behavior in an external electric field. Capacitance of the electric capacitor. Magnetic field. Magnetic induction vector . The Lorentz force . Biot- Savart law . Electrodynamical force . The interaction of two straight linear wires carrying an electric current. Magnetic dipole and its behavior in an external magnetic field.		
	Course content – exercises 1. Multiples and submultiples of physical quantities. 2. Vector algebra: scalar product and vector product. 3. Kinematics: motion with constant acceleration (vertical, horizontal, oblique projection). 4. Dynamics of translational motion: the block slides down an inclined plane. 5. Moments of inertia of molecules. 6. Dynamics of rotational motion: weights suspended on a rope thrown over a pulley. 7. Principle of conservation of angular momentum: a person with dumbbells on a turntable. 8. Rolling of a body without slippage: a solid cylinder rolls down an inclined plane. 9. Oscillatory motion: mathematical and physical pendulum, weight attached to a spring. 10. Doppler effect. 11. Standing waves in pipes and strings. 12. Coulomb's law. Electric field strength on dipole axes. 13. Dipole moments of molecules. 14. Lorentz force: the motion of a charged particle in a magnetic field.		
Prerequisites and co-requisites	Physics at the basic secondary school level		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tutorials: two written tests during the semester	50.0%	100.0%
	Lectures: attendance (a final examination at the end of the second semester covering the material from both semesters)	0.0%	0.0%
Recommended reading	Basic literature	1. D.Halliday, R.Resnick, J.Walker. Podstawy fizyki. T.1 - T.5; PWN, Warszawa 2016. 2. Cz. Bobrowski. Fizyka. Krótki kurs. PWN, Warszawa 2016.	
	Supplementary literature	1. J.Orear. Fizyka T1 i T2. WNT, Warszawa 2008. 2. J.Massalski. Fizyka dla inżynierów. T.1i T.2; PWN, Warszawa 2018.	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1 Moment of inertia . Determination of the moments of inertia of molecules 2 The principle of conservation of angular momentum. Man in a spinning chair . 3 Examples of harmonic oscillators : pendulum , the weight attached to a spring 4 Damped motion. Over time t_1 amplitude of vibrations decreased n_1 times. How many times will decrease the amplitude of vibrations in the time t_2 ? 5 Doppler effect . Doppler ultrasound machine 6 Comparison of the basic features of the gravity and electrostatic fields 7 Comparison of the basic features of the electrostatic and magnetostatic fields 8 Electric dipole . Electric dipole moment . The behavior of the dipole in an external electric field. Determination of the dipole moments of molecules 9 Magnetic dipole . The magnetic dipole moment . The behavior of the dipole in an external magnetic field 10 The interaction between two straight parallel conductors carrying electric current . The definition of the ampere 11 Lorentz force . Definition of tesla . Motion of charge on a circular orbit in a uniform magnetic field. Mass spectrometer. 12 Motion of charge in electric field ($mv^2 / 2 = eU$) . Definition of electronvolt 13 Capacitor and coil. Capacitance and inductance . Definition of farad and henry.
Practical activities within the subject	Not applicable

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