



Subject card

Subject name and code	Physics, PG_00038427						
Field of study	Electrical Engineering						
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			blended-learning		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			7.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Partment of Metrology and Information Systems -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Maciej Łuszczek					
	Teachers	dr Olena Ulitska dr hab. inż. Maciej Łuszczek					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	30.0	0.0	0.0	0.0	75
	E-learning hours included: 45.0						
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	75	10.0		90.0		175
Subject objectives	Introduction to the basic laws of physics. Understanding of the role of physics in our environment and introduction of the methods of mathematically precise description of natural phenomena. Implementation of the differential and integral calculus in physical problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_K02	Student is able to cooperate with the teacher and other students during the analysis of various physical problems aimed to find proper solution.			[SK2] Assessment of progress of work		
	K6_W02	Student is able to recognize physical phenomena and connect them with correct relations what is necessary for solving real problems in various fields of technology if only specific mathematical formulas are used.			[SW1] Assessment of factual knowledge		
	K6_U01	Student is able to use various bibliographic resources and can make correct conclusions.			[SU1] Assessment of task fulfilment		

Subject contents	<p>Course content – lecture</p> <p>Lecture</p> <p>1. Kinematics and Dynamics</p> <ul style="list-style-type: none"> • Kinematics: basic concepts and kinematic quantities, uniform rectilinear motion and uniformly accelerated motion, curvilinear motion, relativity of motion, projectile motion, circular motion. • Dynamics: Newtons laws of motion, inertial and non-inertial reference frames, dynamics of translational motion, dynamics of rotational motion. • Conservation laws in mechanics: conservation of energy, conservation of linear momentum, conservation of angular momentum. <p>2. Gravitation</p> <ul style="list-style-type: none"> • Law of universal gravitation. • Gravitational potential energy. • Intensity and potential of the gravitational field. • Keplers laws. • Escape velocities. <p>3. Oscillations and Waves</p> <ul style="list-style-type: none"> • Simple harmonic motion: equation of motion, energy of oscillations, simple pendulum, physical pendulum, superposition of harmonic motions. • Damped harmonic motion: damping coefficient, logarithmic decrement. • Forced oscillations and resonance: amplitude of forced oscillations, resonance curves. • Waves in elastic media: types of waves, phase velocity, wavelength, wave reflection, composite waves, superposition principle, interference, standing waves, diffraction and refraction, dispersion, group velocity. • Sound waves: audible sounds, ultrasound and infrasound, Doppler effect. <p>4. Thermodynamics</p> <ul style="list-style-type: none"> • States of matter. • Heat, heat balance equation. • Ideal gas equation of state, gas transformations, kinetic theory of an ideal gas. • Laws of thermodynamics. • Internal energy. • Work in gas processes. • Reversible and irreversible processes. • Thermodynamic cycles, Carnot engine. <p>Problem-Solving Classes</p> <p>1. Kinematics Uniform rectilinear motion, uniformly accelerated rectilinear motion, variable motion, curvilinear motion, projectile motion, circular motion.</p> <p>2. Dynamics Newtons laws of motion, inclined plane, conservation of momentum, inertial forces, mechanical work, power, mechanical energy, rotational motion of a rigid body, torque, moment of inertia, conservation of angular momentum.</p> <p>3. Gravitational Field Law of universal gravitation, intensity and potential of the gravitational field, satellite motion in a gravitational field.</p> <p>4. Oscillations and Waves Harmonic motion, simple pendulum, sound.</p> <p>5. Thermodynamics Heat balance, equation of state for gases, gas transformations.</p>
------------------	---

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written test	50.0%	25.0%
	Exam	50.0%	50.0%
	Written test	50.0%	25.0%
Recommended reading	Basic literature	C. Bobrowski, "Fizyka - krótki kurs"	
		D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki"	
	Supplementary literature	R. Feynman, "Feynman Lectures on Physics"	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>Explain basic concepts and quantities in kinematics - position, velocity, acceleration.</p> <p>Discuss three Newton's principles of dynamics.</p> <p>Explain the notion of gravitational potential energy.</p> <p>Discuss energy transfer (kinetic to potential and vice versa) during the motion of mathematical pendulum.</p> <p>What does the term "standing wave" stand for?</p> <p>Discuss two arbitrarily chosen thermodynamic processes.</p>		
Practical activities within the subject	Not applicable		

Document generated electronically. Does not require a seal or signature.