GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00038427		
Field of study	Hydrogen Technologies and Electromobility		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
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	7.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Partment of Metrology and Information Systems -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Maciej Łuszczek	
	Teachers	dr inż. Maria Chomka dr hab. inż. Maciej Łuszczek	

Lesson types and methods of instruction	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: 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	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_W02] has knowledge of physics and chemistry including electrostatics, electromagnetism, electrodynamics, wave motion, acoustics, mechanics, thermodynamics, optics, solid state physics; including knowledge necessary to understand the basic physical phenomena occurring in hydrogen devices, systems and installations as well as automation and robotics systems	The student acquires the ability to associate physical phenomena and appropriate relationships, which can be used to solve real problems in various fields of technology, provided that appropriate mathematical relationships are used.	[SW1] Assessment of factual knowledge
[K6_U01] Is able to obtain information from literature, databases and other sources, integrate them, interpret them and draw conclusions and formulate opinions; has the ability to self-educate m.in. in order to improve professional competences	The student is able to use various bibliographic resources and he/she can make correct conclusions.	[SU1] Assessment of task fulfilment

Subject contents	**1. Mechanics** **Kinematics:** basic concepts and quantities, rectilinear motion with constant acceleration, relativity of motion, projectile motion, circular motion. **Dynamics:** Newton's principles, inertial and non inertial reference systems, transnational motion dynamics, rotational motion dynamics **Conservation laws in dynamics:** conservation of energy, momentum and angular momentum **2. Gravity:** Newton's law of universal gravitation, gravitational potential energy, escape velocity **3. Vibrations and waves.** **Simple harmonic motion:** equation of motion. energy, mathematical pendulum, physical pendulum, superposition of harmonic motions **Damped harmonic motion.** **Forced vibrations and resonance.** **Waves in elastic media:** classification of waves, wave propagation, superposition of waves, standing waves. **Sound waves:** audible sounds, ultra- and infrasound, standing acoustic waves, beats, Doppler's effect **4. Thermodynamics:** states of matter, heat, calorimetric calculations, ideal gas law, thermodynamic processes, kinetic theory of gases, internal energy, work in thermodynamic processes, reversible and non reversible processes, thermodynamic cycles, Carnot's engine. **5. Wave optics essentials:** Huygens principle, reflection and refraction of light, interference and diffraction of light.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written test	50.0%	25.0%
Written test	50.0%	25.0%
Exam	50.0%	50.0%

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	Explain basic concepts and quantities in kinematics - position, velocity, acceleration. Discuss three Newton's principles of dynamics. Explain the notion of gravitational potential energy. Discuss energy transfer (kinetic to potential and vice versa) during the motion of mathematical pendulum. What does the term "standing wave" stand for? Discuss two arbitrarily chosen thermodynamic processes.
Work placement	Not applicable

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