GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00058177		
Field of study	Green Technologies		
Date of commencement of studies	October 2024	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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Physics of Electronic Phenomena -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jędrzej Szmytkowski	
	Teachers	dr hab. inż. Jędrzej Szmytkowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	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	10.0	80.0	135

Subject objectives

The aim is to demonstrate laws of physics

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	Student knows how to use law of physics in daily life	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	Student knows physics and mathematics, which are used in environmental technologies.	[SW1] Assessment of factual knowledge
[K6_K02] is aware of the social role of a technical college graduate, take the reflections on the ethical, scientific and social aspects of the work performed, understands the need to promote, formulating and providing the public with information and opinions concerning the activities of the profession of engineer.	Student is prepared to be engineer	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	About physics. Physical quantities and their units. Elements of vector algebra. Kinematics of a particle: linear motion, cirular 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. Consevation laws in mechanics. Pressure in a Liquid at Rest. Pascal's Principle and Archimedes' Principle. Bernoulli's Law. Oscillations and mechanical waves. Simple, damped and driven vibrations. Mechanical resonance. Beats. Types of waves. The equation of motion for harmonic plane waves. Wave velocity. Examples of diffraction and interference of waves. Standing waves. Doppler effect. Sound intensity level. The following problems will be realized if we will have enough time: Temperature and Heat. Laws of Thermodynamics. 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. Comparison of basic characteristics of the electric field and gravity. Magnetic field. Magnetic induction vector. The Lorentz force. Biot-Savart law. Electrodynamic force. The interaction of two straight linear wires carrying an electric current. Magnetic dipole and its behavior in an external magnetic field.
Prerequisites and co-requisites	Mathematics and physics from lyceum

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture: Written exam	50.0%	60.0%
Tutorials: Writen tests	50.0%	40.0%

Recommended reading

Basic literature	1. D. Halliday, R. Resnick, J. Walker, Fundametals of physics, Wiley 2008 2. W.S. Wolkensztejn, Problems in Physics, PWN 1974
Supplementary literature	1. J. Orear, Physics, Macmillan Publishing Co, 1979 2. W. Hajko, Physics in Examples, WNT 1967
eResources addresses	Adresy na platformie eNauczanie: Fizyka - Zielone Technologie - rok 2024/2025 - Moodle ID: 41866 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41866

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.
3. Examples of harmonic oscillators : simple and physical pendulum, the weight attached to a spring
4. Damped motion. During time t1 the amplitude of vibrations decreased n1 times. How many times will decrease the amplitude of vibrations in the time t2 ?
5. Doppler effect.
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.
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.
12. Motion of charge in electric field (mv2 / 2 = eU) . Definition of electronvolt
13. Capacitor and coil. Capacitance and inductance. Definition of farad and henry.

Work placement	Not applicable

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