GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of physics, PG_00045292		
Field of study	Data Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
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	English
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
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	30.0	15.0	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	6.0	49.0	100

Subject objectives

The aim of the course is to provide the student with the specialist knowledge concerning the basic rules of physics relevant to the technical areas.

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 classical mechanics, statistical physics and thermodynamics, oscillatory and wave motion, and of wave nature of light.	[SU5] Assessment of ability to present the results of task [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 phenomena, concepts, and laws concerning classical mechanics, mechanics of fluids, statistical physics and thermodynamics, oscillatory and wave motion, geometrical and wave optics, relativistic mechanics and nuclear physics.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	LECTURE 1. Kinematics and dynamics of a material point. Principle of conservation of energy. Principle of conservation of momentum and angular momentum. Basic properties of gravitational field. Elements of fluid mechanics. 2. Heat, work, internal energy, gas processes. Elements of the kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics. 3. Harmonic oscillator, superposition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance. 4. Elements of geometrical optics. Wave optics: dispersion, interference, diffraction, and polarization of waves. Basics of holography. Sources of light. 5. Einstein's postulates. Lorentz's transformation and its consequences. 6. Structure of atomic nucleus. Nuclear forces. Radioactivity. TUTORIALS 1. Problems on kinematics of translational motion, description of the motion in Cartesian system. Velocity, acceleration, normal and tangential acceleration. Problems on kinematics of rotational motion, description of the motion in Cartesian system and in a polar coordinate system. Problems on dynamics of progressive motion, applications of Newton's laws. Dynamics laws in non-inertial frame of reference. Problems on conservation of energy, momentum and angular momentum. 2. Problems related to the first law of thermodynamics in the case of the ideal gas. Problems related to the Maxwell distribution. Calculation of entropy changes in reversible transformations of an ideal gas. 3. Examples of harmonic motion. Basics of wave motion. Wave energy density, Poynting's vector, wave intensity. 4. Problems related to the interference of light. Diffraction and polarization of light. Fraunhofer single slit diffraction. The Malus' law.
Prerequisites and co-requisites	No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
final test (lecture)	50.0%	67.0%
written test (tutorials)	50.0%	33.0%

Recommended reading	Basic literature	Halliday D., Resnick R., Walker J., Fundamentals of physics Shankar R., Fundamentals of Physics: Mechanics, Relativity, and Thermodynamics Brown R. G., Introductory Physics I: Elementary Mechanics Bielski S., lecture notes and other materials published at the website: www.mif.pg.gda.pl/homepages/bolo

	Supplementary literature	Sawieliew I. W., Wykłady z fizyki Bobrowski Cz.., Fizyka Collection of physics problems available at the website: www.mif.pg.gda.pl/zz/
	eResources addresses	Adresy na platformie eNauczanie: Basics of Physics_22/23 - Moodle ID: 26845 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26845
Example issues/ example questions/ tasks being completed	Conservation of energy, momentum, and angular momentum in the system of particles. Simple harmonic motion. Energy density of the longitudinal wave. Universal law of radioactive decay. A passenger of a rocket says the length of the rocket is 100 m. Some observer claims the rocket moves away from him at 0.8 of the speed of light. What is the length of the rocket in the frame of the observer? A) 100m B) 80m C) 60m D) 40m The intensity of light emitted by a candle or a bulb after passing through a polarizer A) does not change B) is reduced by a factor of 2 C) is reduced by a factor of 4 D) is reduced to 0 A projectile is fired horizontally from a gun that is 45.0 m above flat ground, emerging from the gun with a speed of 250 m/s. (a) How long does the projectile remain in the air? (b) At what horizontal distance from the firing point does it strike the ground? (c) What is the magnitude of the vertical component of its velocity as it strikes the ground?	
Work placement	Not applicable	

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