



Subject card

Subject name and code	Basics of physics, PG_00045292						
Field of study	Data Engineering						
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		English		
Semester of study	2		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Katedra Fizyki Atomowej i Luminescencji -> Faculty Of Applied Physics And Mathematics -> Wydział Politechniki Gdańskiej						
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] formulates logical solutions to complex or unstructured problems		The student solves simple problems of classical mechanics, thermodynamics, oscillatory and wave motion and wave nature of light.		[SU1] Assessment of task fulfilment		
	[K6_W02] demonstrates advanced preparation in methods and techniques for formulating and solving problems		The student names and explains the basic phenomena, concepts, dependencies and laws concerning classical mechanics, fluid mechanics, thermodynamics, oscillatory and wave motion, geometrical and wave optics, relativistic mechanics. and nuclear physics.		[SW1] Assessment of factual knowledge		
	[K6_U06] acquires new knowledge, planning its own development in aiming at achieving defined goals		As a future engineer, the student deepens critical thinking skills, as well as quantitative reasoning and creativity.		[SU1] Assessment of task fulfilment		

Subject contents	LECTURE		
	<p>1. SI units, vectors</p> <p>2. 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.</p> <p>3. Heat, work, internal energy, gas processes. Elements of the kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics.</p> <p>4. Harmonic oscillator, superposition of oscillations. Mechanical waves. Transverse and longitudinal waves. Energy density.</p> <p>5. Elements of geometrical optics. Wave optics: interference, diffraction, and polarization of waves.</p> <p>6. Einstein's postulates. Lorentz's transformation and its consequences.</p>		
	TUTORIALS		
	<p>1. Problems on kinematics of translational motion, description of motion in the Cartesian system. Velocity, acceleration, normal and tangential acceleration. Problems on kinematics of rotational motion. Problems on dynamics of translational motion, applications of Newton's laws. Problems on conservation of energy and momentum.</p> <p>2. Problems related to the first law of thermodynamics in the case of the ideal gas.</p> <p>3. Examples of harmonic motion. Basics of wave motion.</p> <p>4. Problems related to the interference of light. Diffraction from a single slit.</p>		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tutorials: two written tests	50.0%	33.0%
	Lecture: final test	50.0%	67.0%
Recommended reading	Basic literature	University Physics, Openstax	
		Halliday D., Resnick R., Walker J., Fundamentals of physics	
	Supplementary literature	Shankar R., Fundamentals of Physics: Mechanics, Relativity, and Thermodynamics	
		Brown R. G., Introductory Physics I: Elementary Mechanics	
		Orear J., Physics	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	<p>Conservation of energy, momentum, and angular momentum in a system of particles.</p> <p>Simple harmonic motion.</p> <p>Energy density of the longitudinal wave.</p> <p>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</p> <p>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</p> <p>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?</p>
Work placement	Not applicable

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