



Subject card

Subject name and code	Physics I, PG_00047722						
Field of study	Biomedical 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		blended-learning		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Katedra Fizyki Atomowej i Luminescencji -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Patrycja Stefańska-Ptaszek				
	Teachers		dr inż. Patrycja Stefańska-Ptaszek dr inż. Ewa Erdmann				
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: 2.0						
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		5.0		50.0	100
Subject objectives	Providing the student with the specialist knowledge concerning the basic rules of physics immediately relevant to the technical areas.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		

Subject contents	<p>LECTURE</p> <p>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 mechanics of fluids.</p> <p>2. Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics.</p> <p>3. Harmonic oscillator, addition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance.</p> <p>4. Elements of geometrical optics. Wave optics: dispersion, interference, diffraction, and polarization of waves. Basics of holography. Sources of light.</p> <p>5. Einstein's postulates. Lorentz's transformation and its consequences. Relativistic optics.</p> <p>6. Structure of atomic nucleus. Nuclear forces. Radioactivity.</p> <p>7. Wave-particle duality. Wave function. The Heisenberg uncertainty relations. Schrödinger's equation.</p> <p>PRACTICE</p> <p>1. Problems on kinematics of progressive 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.</p> <p>2. Problems related to the first law of thermodynamics in the case of an ideal gas. Problems related to Maxwell distribution. Calculation of entropy changes in reversible transformations of an ideal gas.</p> <p>3. Examples of harmonic motion. Basics of wave motion. Wave energy density, Poynting's vector, wave intensity.</p> <p>4. Problems related to the interference of light. Diffraction and polarization of light. Fraunhofer single slit diffraction. Malus's law.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Solving of the problems	50.0%	33.0%
	Knowledge of the lecture material	50.0%	67.0%
Recommended reading	<p>Basic literature</p> <p>1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki tom 1-5, PWN.</p> <p>2. Sawieliew I. W., Wykłady z fizyki, volume I-3, PWN.</p> <p>3. Bobrowski Cz., Fizyka, WNT</p> <p>4. Collection of physics problems published at the website: www.mif.pg.gda.pl/zz/</p>		

	Supplementary literature	1. Orear J., Fizyka, volume 1 i 2, WNT. 2. Resnick R., Halliday D., Fizyka, volume 1 i 2, PWN. 3. R.P. Feynman, Feynmana Wykłady z Fizyki, volume 1-3, PWN. 4. Bujko A., Zadania z fizyki z rozwiązaniami i komentarzami, WNT.
	eResources addresses	Adresy na platformie eNauczanie:
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	
Work placement	Not applicable	

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