



Subject card

Subject name and code	Physics I, PG_00047722						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
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	Division of Electron Collisions Physics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Patrycja Stefańska-Ptaszek				
	Teachers		dr inż. Ewa Erdmann dr inż. Patrycja Stefańska-Ptaszek				
Lesson types	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 biomedical engineering and the technical areas.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn		Student lists and explains basic phenomena, concepts and laws of classical mechanics, fluid mechanics, statistical physics and thermodynamics. Student solves simple problems of classical mechanics, statistical physics and thermodynamics.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study		Student lists and explains basic and complex phenomena, concepts and laws relating to the foundations of physics and modern physics.		[SW1] Assessment of factual knowledge		

Subject contents	<p>Course content – lecture</p> <p>LECTURE:</p> <ol style="list-style-type: none"> 1. Kinematics and dynamics of a material point. Rectilinear and curvilinear movement. Principle of conservation of momentum and angular momentum. 2. Basic properties of gravitational field. 3. Elements of mechanics of fluids. 4. Application of basic laws of fluid mechanics (Pascal's principle, Archimedes' principle, Bernoulli's principle, continuity equation) to describe physical parameters in the circulatory system. 5. Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases 6. Entropy, reversible and non-reversible processes. Laws of thermodynamics. 7. Harmonic oscillator, addition of oscillations. 8. Elastic waves. Transverse and longitudinal waves. Basic properties of acoustic waves. 9. Energy density and intensity of wave. <p>PRACTICE</p> <ol style="list-style-type: none"> 1. Solving problems using vector operations in physical space. 2. Problems from kinematics of translational motion; velocity and acceleration as derivatives; application of Newton's laws of dynamics. 3. Solving problems using the principles of conservation of energy, momentum and angular momentum. 4. Calculations of moments of inertia and analysis of rotational motion of a rigid body around a fixed axis. 5. Fluid mechanics - problems related to Archimedes' principle, continuity equations and Bernoulli's. 6. Calculation of changes in temperature and amount of heat in thermal processes; transformations of an ideal gas using the equation of state; statistical analysis of the distribution of gas particle velocities based on the Maxwell distribution. 7. Solving equations of harmonic motion - calculations of periods, amplitudes and energy of vibrations. 8. Problems from the scope of wave motion - analysis of wavelength, frequency, velocity and the Doppler effect in various systems. 											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1070 794 1099">Subject passing criteria</th> <th data-bbox="799 1070 1137 1099">Passing threshold</th> <th data-bbox="1142 1070 1481 1099">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1106 794 1135">Knowledge of the lecture material</td> <td data-bbox="799 1106 1137 1135">50.0%</td> <td data-bbox="1142 1106 1481 1135">67.0%</td> </tr> <tr> <td data-bbox="456 1142 794 1171">Solving of the problems</td> <td data-bbox="799 1142 1137 1171">50.0%</td> <td data-bbox="1142 1142 1481 1171">33.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Knowledge of the lecture material	50.0%	67.0%	Solving of the problems	50.0%	33.0%
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Knowledge of the lecture material	50.0%	67.0%										
Solving of the problems	50.0%	33.0%										
Recommended reading	<p>Basic literature</p>	<ol style="list-style-type: none"> 1. D. Halliday, R. Resnick, J. Walker, Fundamentals of physics. volume 1-2, PWN. 2. Sawieliew I. W., Wykłady z fizyki, volume I-3, PWN. 3. Bobrowski Cz., Fizyka, WNT 4. Handbook OpenStax published at the website: https://openstax.org/details/books/fizyka-dla-szk%C3%B3%C5%82-wy%C5%BCszych-tom-1 5. Collection of physics problems published at the website: www.mif.pg.gda.pl/zz/ 										
	<p>Supplementary literature</p>	<ol style="list-style-type: none"> 1. Orear J., Fizyka, volume 1 i 2, WNT. 2. Resnick R., Halliday D., Fizyka, volume 1 - 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. 5. A.K. Wróblewski, J.A. Zakrzewski, Wstęp do fizyki, PWN, 1984, volume 1 - 2 										

	eResources addresses	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • Conservation of energy, momentum, and angular momentum in the system of particles. • Laws of thermodynamics • Transformations of an ideal gas. • Simple and damped harmonic motion. • Energy density of the longitudinal wave. • Derive the formula for the range of an oblique projection when the angle of projection, initial velocity, and acceleration due to gravity are given. • Ball A with a mass of 2 kg and a speed of 2 m/s hits centrally and elastically the resting ball B. What mass should ball B have so that after the collision the velocity of ball A changes direction and is 1 m/s? 	
Practical activities within the subject	Not applicable	

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