



## Subject card

Subject name and code	Physics I, PG_00047722						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Patrycja Stefańska-Ptaszek					
	Teachers	dr inż. Ireneusz Linert dr inż. Patrycja Stefańska-Ptaszek					
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		
	[K6_W03] Knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student enumerates and explains the basic and the complex phenomena, concepts and laws concerning the basics of physics and modern physics.			[SW1] Assessment of factual knowledge		
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions	Student enumerates and explains the basic phenomena, concepts, and laws concerning classical mechanics, mechanics of fluids, statistical physics and thermodynamics. Solves simple problems of classical mechanics, statistical physics and thermodynamics.			[SK2] Assessment of progress of work [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SK4] Assessment of communication skills, including language correctness		

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	<table border="1"> <thead> <tr> <th data-bbox="456 1552 794 1585">Subject passing criteria</th> <th data-bbox="799 1552 1137 1585">Passing threshold</th> <th data-bbox="1142 1552 1481 1585">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1585 794 1619">Solving of the problems</td> <td data-bbox="799 1585 1137 1619">50.0%</td> <td data-bbox="1142 1585 1481 1619">33.0%</td> </tr> <tr> <td data-bbox="456 1619 794 1653">Knowledge of the lecture material</td> <td data-bbox="799 1619 1137 1653">50.0%</td> <td data-bbox="1142 1619 1481 1653">67.0%</td> </tr> </tbody> </table>			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%
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Solving of the problems	50.0%	33.0%										
Knowledge of the lecture material	50.0%	67.0%										
Recommended reading	Basic literature	<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: <a href="http://www.mif.pg.gda.pl/zz/">www.mif.pg.gda.pl/zz/</a></p>										

	Supplementary literature	<p>1. Orear J., Fizyka, volume 1 i 2, WNT.</p> <p>2. Resnick R., Halliday D., Fizyka, volume 1 i 2, PWN.</p> <p>3. R.P. Feynman, Feynmana Wykłady z Fizyki, volume 1-3, PWN.</p> <p>4. Bujko A., Zadania z fizyki z rozwiązaniami i komentarzami, WNT.</p>
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Fizyka-I_2024_IBM - Moodle ID: 36382</p> <p><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36382">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36382</a></p>
Example issues/ example questions/ tasks being completed	<p>Conservation of energy, momentum, and angular momentum in the system of particles.</p> <p>Simple harmonic motion.</p> <p>Energy density of the longitudinal wave.</p> <p>Universal law of radioactive decay</p>	
Work placement	Not applicable	