



Subject card

Subject name and code	Physics, PG_00038086						
Field of study	Automation, Robotics and Control Systems						
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	1	ECTS credits			7.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Partment of Metrology and Information Systems -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Maciej Łuszczek				
	Teachers		dr inż. Maria Chomka dr hab. inż. Maciej Łuszczek dr Olena Ulitska				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 30.0						
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	60		28.0		87.0	175
Subject objectives	Introduction to the basic laws of physics. Understanding of the role of physics in our environment and introduction of the methods of mathematically precise description of natural phenomena. Implementation of the differential and integral calculus in physical problems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions		Student is able to use various bibliographic resources and can make correct conclusions.		[SU1] Assessment of task fulfilment		
	[K6_W02] has basic knowledge of physics including electrostatics, electromagnetism, electrodynamics, wave motion, acoustics, mechanics, thermodynamics, optics, solid state physics; including knowledge necessary to understand the basic physical phenomena occurring in devices of systems and systems of automation and robotics		Student is able to recognize physical phenomena and connect them with correct relations what is necessary for solving real problems in various fields of technology if only specific mathematical formulas are used.		[SW1] Assessment of factual knowledge		
	[K6_K02] can work in a group taking on different roles in it		Student is able to cooperate with the teacher and other students during the analysis of various physical problems aimed to find proper solution.		[SK2] Assessment of progress of work		

Subject contents	<p>Course content – lecture Lecture</p> <p>1. Kinematics and Dynamics</p> <ul style="list-style-type: none"> • Kinematics: basic concepts and kinematic quantities, uniform rectilinear motion and uniformly accelerated motion, curvilinear motion, relativity of motion, projectile motion, circular motion. • Dynamics: Newtons laws of motion, inertial and non-inertial reference frames, dynamics of translational motion, dynamics of rotational motion. • Conservation laws in mechanics: conservation of energy, conservation of linear momentum, conservation of angular momentum. <p>2. Gravitation</p> <ul style="list-style-type: none"> • Law of universal gravitation. • Gravitational potential energy. • Intensity and potential of the gravitational field. • Keplers laws. • Escape velocities. <p>3. Oscillations and Waves</p> <ul style="list-style-type: none"> • Simple harmonic motion: equation of motion, energy of oscillations, simple pendulum, physical pendulum, superposition of harmonic motions. • Damped harmonic motion: damping coefficient, logarithmic decrement. • Forced oscillations and resonance: amplitude of forced oscillations, resonance curves. • Waves in elastic media: types of waves, phase velocity, wavelength, wave reflection, composite waves, superposition principle, interference, standing waves, diffraction and refraction, dispersion, group velocity. • Sound waves: audible sounds, ultrasound and infrasound, Doppler effect. <p>4. Thermodynamics</p> <ul style="list-style-type: none"> • States of matter. • Heat, heat balance equation. • Ideal gas equation of state, gas transformations, kinetic theory of an ideal gas. • Laws of thermodynamics. • Internal energy. • Work in gas processes. • Reversible and irreversible processes. • Thermodynamic cycles, Carnot engine. <p>Problem-Solving Classes</p> <p>1. Kinematics Uniform rectilinear motion, uniformly accelerated rectilinear motion, variable motion, curvilinear motion, projectile motion, circular motion.</p> <p>2. Dynamics Newtons laws of motion, inclined plane, conservation of momentum, inertial forces, mechanical work, power, mechanical energy, rotational motion of a rigid body, torque, moment of inertia, conservation of angular momentum.</p> <p>3. Gravitational Field Law of universal gravitation, intensity and potential of the gravitational field, satellite motion in a gravitational field.</p> <p>4. Oscillations and Waves Harmonic motion, simple pendulum, sound.</p> <p>5. Thermodynamics Heat balance, equation of state for gases, gas transformations.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 1561 794 1594">Subject passing criteria</th> <th data-bbox="794 1561 1141 1594">Passing threshold</th> <th data-bbox="1141 1561 1487 1594">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1594 794 1628">Written test I</td> <td data-bbox="794 1594 1141 1628">50.0%</td> <td data-bbox="1141 1594 1487 1628">25.0%</td> </tr> <tr> <td data-bbox="448 1628 794 1662">Written test II</td> <td data-bbox="794 1628 1141 1662">50.0%</td> <td data-bbox="1141 1628 1487 1662">25.0%</td> </tr> <tr> <td data-bbox="448 1662 794 1697">Exam</td> <td data-bbox="794 1662 1141 1697">50.0%</td> <td data-bbox="1141 1662 1487 1697">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written test I	50.0%	25.0%	Written test II	50.0%	25.0%	Exam	50.0%	50.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>C. Bobrowski, "Fizyka - krótki kurs"</p> <p>D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki"</p> <p>R. Feynmann, "Feynman Lectures on Physics"</p>													

<p>Example issues/ example questions/ tasks being completed</p>	<p>Explain basic concepts and quantities in kinematics - position, velocity, acceleration.</p> <p>Discuss three Newton's principles of dynamics.</p> <p>Explain the notion of gravitational potential energy.</p> <p>Discuss energy transfer (kinetic to potential and vice versa) during the motion of mathematical pendulum.</p> <p>What does the term "standing wave" stand for?</p> <p>Discuss two arbitrarily chosen thermodynamic processes.</p>
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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