



## Subject card

Subject name and code	, PG_00057765						
Field of study	Green Technologies						
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		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department Of Physics Of Electronic Phenomena -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jędrzej Szmytkowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60		10.0		80.0	150
Subject objectives	The aim is to demonstrate laws of physics						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions		Student has knowledge about physics and mathematics to apply it in analytical sciences and environmental technologies		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods		Student is prepared to learn physics during his life		[SW1] Assessment of factual knowledge		
	[K6_K02] is aware of the social role of a technical college graduate, take the reflections on the ethical, scientific and social aspects of the work performed, understands the need to promote, formulating and providing the public with information and opinions concerning the activities of the profession of engineer.		Student knows how to interpret results of his research		[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>The lecture is a continuation of lecture in Physics from last semester. Therefore, it is possible to describe some selected problems from recent semester.</p> <p>(In the academic year 2022/2023, there are no "Physics" lectures, because the field of study "Green Technologies" does not exist)</p> <p>Electromagnetic induction. Faraday's law. Self-induction and mutual induction. Maxwell's equations. Geometrical optics. Mirrors. Lenses. Reflection and refraction of light. Electromagnetic waves. Interference of light. Dispersion. Diffraction. Gratings. Polarization of light. Elements of relativistic physics. Introduction to quantum physics - radiation of black body, photoelectric effect, Compton effect. The Bohr atom. Spectral series. Heisenberg's uncertainty principle. The matter (de Broglie) waves. Schrodinger equation. Particle in quantum well. Quantum tunneling. Quantum numbers. Atomic terms. Zeeman effect. Lasers. Electronic band structure of solid state. Semiconductors. Diode. Superconductors. Elements of nuclear physics - alpha, beta and gamma particles. Models of atomic nucleus. Nuclear reactions. Elementary particles.</p>		
Prerequisites and co-requisites	Students must pass an exam in Physics from last semester.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tutorials: Written tests	50.0%	40.0%
	Lecture: Written exam	50.0%	60.0%
Recommended reading	Basic literature		<p>1. H. Sodolski, Selected problems in physics with examples and exercises, Wydawnictwo Politechniki Gdańskiej 2007</p> <p>2. D. Halliday, R. Resnick, J. Walker, Fundamentals of physics, Wiley 2008</p>
	Supplementary literature		<p>1. J. Orear, Physics, Macmillan Publishing Co, 1979</p> <p>2. S.P. Myasnikov, T.N Osanova, Selected Problems in Physics, Mir Publishers 1990</p>
	eResources addresses		Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. Electromagnetic induction</p> <p>2. Laws of geometrical optics</p> <p>3. The Bohr atom.</p> <p>4. Schrodinger equation.</p>		
Work placement	Not applicable		

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