



## Subject card

Subject name and code	, PG_00048761						
Field of study	Green Technologies						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jędrzej Szmytkowski					
	Teachers	dr Małgorzata Franz dr hab. inż. Jędrzej Szmytkowski					
Lesson types and methods of instruction	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: 0.0 Adresy na platformie eNauczanie:						
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	5.0		60.0		125
Subject objectives	The aim is to demonstrate laws of physics						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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_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_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>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	<table border="1" data-bbox="451 573 1487 607"> <thead> <tr> <th data-bbox="451 573 794 607">Subject passing criteria</th> <th data-bbox="794 573 1137 607">Passing threshold</th> <th data-bbox="1137 573 1487 607">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 607 794 640">Tutorials: Written tests</td> <td data-bbox="794 607 1137 640">50.0%</td> <td data-bbox="1137 607 1487 640">40.0%</td> </tr> <tr> <td data-bbox="451 640 794 674">Lecture: Written exam</td> <td data-bbox="794 640 1137 674">50.0%</td> <td data-bbox="1137 640 1487 674">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tutorials: Written tests	50.0%	40.0%	Lecture: Written exam	50.0%	60.0%
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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											
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											