



## Subject card

Subject name and code	Physics II, PG_00043530						
Field of study	Environmental Engineering						
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			Polish		
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 Małgorzata Franz					
	Teachers	dr Małgorzata Franz dr inż. Damian Glowienka dr inż. Justyna Szostak					
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	8.0		66.0		134
Subject objectives	The aim of the course is to familiarize students with the issues of classical mechanics and elements of modern physics.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U01] has the ability to self-education, can obtain information from literature, databases and other sources, uses information technology, Internet resources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions	The acquired knowledge allows for independent analysis of selected physics issues in the surrounding reality. The student carries out correct calculations and does transformations on units.			[SU4] Assessment of ability to use methods and tools		
	[K6_W02] has knowledge of physics, including mechanics, thermodynamics, optics, electricity and magnetism, nuclear physics and solid state physics, including knowledge necessary to: 1) understand the basic physical phenomena related to material durability, fluid mechanics and hydraulics, building physics, geodetic measurements ; 2) understanding the principles of operation of basic electrical devices and systems; 3) solving project tasks of the sanitary industry;	The student describes and interprets the basic physical phenomena, predicts the course of phenomena based on the learned laws, performs logical reasoning adequate to the solved physical problem.			[SW1] Assessment of factual knowledge		

Subject contents	<b>LECTURES:</b> Vibrations: SHM, damped and forced vibrations, mechanical resonance. Waves: the equation of wave motion, the speed of the wave, examples of waves diffraction and interference, standing waves, Doppler effect. Fundamentals of fluids mechanics. Electric field: Coulomb's law, the electric field, electric potential. Magnetic field: the magnetic field, Lorentz force, Biot-Savart law, electrodynamic force. Spectrum of electromagnetic waves. Geometrical optics: the laws of light reflection and refraction. Wave optics: polarization, diffraction and interference, diffraction grating. Spectral analysis of light, optical spectrometer. Quantum properties of radiation: thermal radiation, photoelectric effect, Compton effect, photons. Bohr model of the hydrogen atom. De Broglie waves. Heisenberg uncertainty principle. Schrödinger equation. Constituents of the nucleus. Nuclear forces and binding energy. Exponential decay law. Alpha, beta and gamma. Applications of radioactive isotopes. <b>TUTORIALS:</b> 1. Gravitational field. 2. Vibrations and waves. 3. Fundamentals of fluids mechanics. 4. Electric field. 5. Electric current and capacitors. 6. Magnetic field. 7. Photoelectric and Compton effects. 6. Bohr's model of hydrogen atom.		
Prerequisites and co-requisites	Knowledge from Physics - semester I		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	50.0%
	Midterm colloquium	50.0%	50.0%
Recommended reading	Basic literature	1. D.Holiday, R.Resnick, J.Walker. Podstawy fizyki. T.1 - T.5; PWN, Warszawa 2003. 2. Cz. Bobrowski. Fizyka. Krótki kurs; WNT, Warszawa (dowolne wydanie).	
	Supplementary literature	1.J.Orear. Fizyka T.1 i T.2; WNT, Warszawa (dowolne wydanie). 2.J.Massalski. Fizyka dla inżynierów. T.1 i T.2; WNT, Warszawa 2007.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Sample exam questions:  What is the photoelectric effect?  Describe the Bohr model of the hydrogen atom.  Based on Bohr's model, find formula for the radius, velocity and energy of the electron in the n-orbit.		
Work placement	Not applicable		