



Subject card

Subject name and code	Basics of Physics, PG_00058905						
Field of study	Informatics						
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 Subject group related to scientific research in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			6.0		
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 inż. Ireneusz Linert					
	Teachers	dr inż. Ireneusz Linert					
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: 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	45	12.0		93.0		150
Subject objectives	The aim of the course is to acquaint students with the issues of electrodynamics, wave optics, quantum properties of radiation and the structure of matter.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W02] Knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	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_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	Student solves simple problems of classical mechanics, statistical physics and thermodynamics and harmonic motion.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		

Subject contents	<p>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>Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics.</p> <p>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>Elements of geometrical optics. The wave nature of light: Huygen's principle, interference, Young's double – slit experiment, diffraction grating, interference by thin films, polarization, Maluses law, Brewster phenomena.</p> <p>Electric field: Coulomb's law, the electric field, the electric flux, Gauss's law, the work done by the electric field, electric potential, the electric dipole.</p> <p>Capacitors. Electric current: electric current, the current density, drift speed, resistivity, conductivity, resistor, resistors in series and parallel, the work, power, EMF, Kirchhoff's rules.</p> <p>Magnetic field: the magnetic field, force on an electric charge in magnetic field, cyclotron resonance frequency, force on electric current in a magnetic field, right hand rule, Ampere's law, Biot-Savart's law.</p> <p>Electrodynamics: Farada's laws, induced EMF, induction, Maxwell's equations.</p> <p>Electromagnetic oscillations and waves: oscillations in LC circuit, oscillations in open electric circuit, radiation of oscillating dipole, properties of electromagnetic waves, electromagnetic spectrum, energy in EM waves, energy flow and Poynting vector.</p> <p>Quantum properties of radiation: blackbody radiation, the emissivity, Kirchhoff's law, Stefan-Boltzman's law, Wien's law, Planck's quantum hypothesis, photoelectric effect, Compton's effect.</p> <p>Structure of matter: early models of the atom, spectral analysis.</p> <p>Basis of quantum mechanics: wave nature of matter, Davisson-Germer experiment, wave function, Schrödinger equation, Heisenberg uncertainty principle, tunneling phenomena.</p> <p>Basis of solid physics: electrical properties of solid state, band theory of solids, pn junction, light emitting diode, transistor, plastic electronics.</p>											
Prerequisites and co-requisites	Knowledge of the basic laws of physics, the ability to use calculus, basic knowledge of handling simple measuring instruments (ammeter, voltmeter).											
Assessment methods and criteria	<table border="1" data-bbox="448 1382 1489 1487"> <thead> <tr> <th data-bbox="448 1382 794 1417">Subject passing criteria</th> <th data-bbox="794 1382 1141 1417">Passing threshold</th> <th data-bbox="1141 1382 1489 1417">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1417 794 1453">Lecture credit</td> <td data-bbox="794 1417 1141 1453">50.0%</td> <td data-bbox="1141 1417 1489 1453">60.0%</td> </tr> <tr> <td data-bbox="448 1453 794 1487">Midterm tests</td> <td data-bbox="794 1453 1141 1487">50.0%</td> <td data-bbox="1141 1453 1489 1487">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture credit	50.0%	60.0%	Midterm tests	50.0%	40.0%
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Lecture credit	50.0%	60.0%										
Midterm tests	50.0%	40.0%										
Recommended reading	Basic literature	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	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	Adresy na platformie eNauczanie:										
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											