GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00047797		
Field of study	Informatics		
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 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

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	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.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents	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. Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics. Harmonic oscillator, addition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance. 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. Electric field: Coulomb's law, the electric field, the electric flux, Gauss's law, the work done by the electric field, electric potential, the elelctric dipole. 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. 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, Ampereąs law, Biot-Savart's law. Electrodynamics: Farada's laws, induced EMF, induction, Maxwell's equations. 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. 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. Structure of matter: early models of the atom, spectral analysis. Basis of quantum mechanics: wave nature of matter, Davisson-Germer experiment, wave function, Schrödinger equation, Heisenberg uncertainty principle, tunneling phenomena. Basis of solid physics: electrical properties of solid state, band theory of solids, pn junction, light emitting diode, transistor, plastic electronics.
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

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm tests	50.0%	40.0%
Lecture credit	50.0%	60.0%

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	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	