



Subject card

Subject name and code	Physics, PG_00054684						
Field of study	Biotechnology						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
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	Division of Complex Systems Spectroscopy -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Tomasz Wąsowicz				
	Teachers		dr inż. Marcin Dampc dr hab. Tomasz Wąsowicz dr inż. Ireneusz Linert mgr inż. Michał Jurkowski dr inż. Iga Szpunar				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	30.0	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		55.0	125
Subject objectives	The main objective of the course is: acquire a certain amount of knowledge of general physics, teach thinking in terms of cause-and-effect relationships and to understand the limitations imposed by the fundamental laws of physics, acquire problem-solving skills encountered in engineering work						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W01		Student can identify and understand physical phenomena and can describe them by the use of theoretical models		[SW1] Assessment of factual knowledge		
	K6_U01		Student can perform an experiment and interpret its results		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		

Subject contents	LECTURES OPTICS. Spectrum of electromagnetic waves. Geometric optics: the laws of light reflection and refraction, prism. Wave optics: polarization, diffraction and interference, diffraction grating. Quantum properties of radiation: thermal radiation, photoelectric effect, photons. ATOMIC PHYSICS. Bohr model of the hydrogen atom. Vector model of the atom, quantum numbers, spin-orbit coupling , spin magnetic resonance. X-rays. De Broglie waves. NUCLEAR PHYSICS. Constituents of the nucleus. Nuclear forces and binding energy. Spin and magnetic moment of nucleus. Nuclear magnetic resonance. Exponential decay law. Applications of radioactive isotopes. Fission and fusion reactions.		
	TUTORIALS 1. Geometric optics. 2. Wave optics. 3. Thermal radiation. 4. Photoelectric effect. Bohrs model of hydrogen atom. 5. X-rays. Braggs law. De Broglie waves. 6. Nuclear forces and binding energy. Exponential decay law.		
	LABORATORY 1. MECHANICS: mechanics of particles and rigid bodies, elastic collisions, hydrostatics. 2. GRAVITATIONAL FIELD: acceleration due to gravity on the Earth. 3. MECHANICAL WAVES: mechanical resonance, standing waves. 4. ELECTRIC FIELD: electric field distribution, dielectric constant, capacitors, resistors. 5. MAGNETIC FIELD: magnetic field of the Earth, magnetic force on a current-carrying conductor . 6. OPTICS: refractive index, interference, polarization. 7. ATOMIC PHYSICS: atomic emission spectra.		
Prerequisites and co-requisites	Knowledge from Physics semester I		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	20.0%
	Written exam	50.0%	50.0%
	Laboratory	100.0%	30.0%
Recommended reading	Basic literature	Halliday, Resnick, Walker, "Fundamentals of Physics", John Wiley & Sons, Inc. 2001	
	Supplementary literature	2.V.Acosta, C.L.Cowan, B.J.Graham. Essentials of Modern Physics, Harper & Row 1973.	
	eResources addresses	Adresy na platformie eNauczanie: Laboratorium fizyczne dla Biotechnologii (2023) - Moodle ID: 10291 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=10291 ŁATFIZNA. Łatwa nauka fizyki - Moodle ID: 27362 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=27362 Wykład FIZYKA dla BT 22/23 - sem let - Nowy - Moodle ID: 30721 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30721	
Example issues/ example questions/ tasks being completed	Bohr's model of the atom of hydrogen. Bohr orbits. Rydberg formula. Bohr magneton. Calculate the wavelength of the red line of the Balmer series Quantum numbers. Orbital, spin and total angular momentum. Spatial quantization of angular moments		
Work placement	Not applicable		

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