



Subject card

Subject name and code	Physics, PG_00054684						
Field of study	Biotechnology						
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		
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	Zakład Spektroskopii Układów Złożonych -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Tomasz Wąsowicz					
	Teachers	dr inż. Ireneusz Linert mgr inż. Michał Jurkowski dr hab. Tomasz Wąsowicz dr inż. Marcin Dampc					
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_U01	Student can perform an experiment and interpret its results			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	K6_W01	Student can identify and understand physical phenomena and can describe them by the use of theoretical models			[SW1] Assessment of factual knowledge		

Subject contents	<p>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.</p> <p>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.</p> <p>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.</p>														
Prerequisites and co-requisites	Knowledge from Physics semester I														
Assessment methods and criteria	<table border="1" data-bbox="451 663 1487 801"> <thead> <tr> <th data-bbox="451 663 794 696">Subject passing criteria</th> <th data-bbox="794 663 1137 696">Passing threshold</th> <th data-bbox="1137 663 1487 696">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 696 794 730">Laboratory</td> <td data-bbox="794 696 1137 730">100.0%</td> <td data-bbox="1137 696 1487 730">30.0%</td> </tr> <tr> <td data-bbox="451 730 794 763">Written exam</td> <td data-bbox="794 730 1137 763">50.0%</td> <td data-bbox="1137 730 1487 763">50.0%</td> </tr> <tr> <td data-bbox="451 763 794 801">Midterm colloquium</td> <td data-bbox="794 763 1137 801">50.0%</td> <td data-bbox="1137 763 1487 801">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory	100.0%	30.0%	Written exam	50.0%	50.0%	Midterm colloquium	50.0%	20.0%
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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														