GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00054684		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Tomasz Wąsowicz	
	Teachers		

Lesson types

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	[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
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

Course content – lecture
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%	25.0%
Written exam	50.0%	50.0%
Laboratory	100.0%	25.0%

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	

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
Practical activites within the subject	Not applicable

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