GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058941		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
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	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Kamil Kolincio	
	Teachers	dr hab. inż. Beata Bochentyn dr inż. Kamil Kolincio	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	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	5.0	25.0	75

Subject objectives	Getting to know the basic laws of modern physics. Acquiring the ability to analyze physical phenomena and solve technical problems based on the laws of physics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W03	The student knows the basic branches of modern physics. He can describe groundbreaking experiments leading to the development of quantum physics. The student independently solves problems related to modern physics	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
K6_U01	The student independently extends the knowledge obtained during the course based on the recommended textbooks and available sources, including the Internet. He can assess their substantive quality and skillfully uses them.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
K6_U04	The student is able to conduct experiments on his own laboratory. He can use the instruments available in the laboratory. The obtained results are presented in a report containing correctly formulated conclusions and assessment of measurement uncertainty.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
K6_W01	The student uses his knowledge of modern physics to describe the world. He understands the physical foundations of quantum mechanics and can use them to describe the phenomenon of the microworld	[SW1] Assessment of factual knowledge

Subject contents

Speed of light, Michelson-Morley experiment, Special theory of relativityTime dilation and length contractionThe relativity of simultaneityLorentz transformationsThe twin paradox and other paradoxesRelativistic dynamics: mass. relativistic momentum and energyEquivalence of mass and energyRelativistic relationship between momentum and energyParticle creationBlackbody radiationThe photoelectric effectWaves and particles, atomic spectra, Pauli exclusion principleEarly models of the atom, Rutherford's experiment and the beginnings of nuclear physics, Bohr's atomWave equations for photons and electronsAngular momentum, electron spin, periodic tableStable and unstable nuclei, decay mechanism, nuclear fission, standard model.Synchrotron radiation

Prerequisites and co-requisites

The course is dedicated to students who have previously successfully completed the general physics course (Physics I and Physics II)

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	40.0%
Practical exercise	50.0%	30.0%
Laboratory	100.0%	30.0%

Recommended reading

Basic literature	1. D. Haliday, R. Resnick, J. Walker, Podstawy fizyki, Wyd. PWN 2. W.Moebs, S.J.Ling, J.Sanny, Fizyka dla szkół wyższych, Tom 3, OpenStax Polska https://cnx.org/contents/u2KTPvIK@8.12:gX9LxBpm@5/5-2-Wzgl%C4%99dno%C5%9B%C4%87-jednoczesno%C5%9Bci-zdarze%C5%84#0 3. J. Massalski, Fizyka dla inżynierów. Część II. Fizyka współczesna, Wyd. WNT P.A. Tipler, R.A. Llewellyn, Fizyka współczesna, Wyd. PWN
Supplementary literature	Ohanian, Hans C., and John T. Markert. Physics for Engineers and Scientists. Vol. 1. 3rd ed. New York, NY: Norton, 2007. ISBN: 9780393930030

	eResources addresses	Adresy na platformie eNauczanie: Fizyka współczesna - Moodle ID: 43744 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43744
Example issues/ example questions/ tasks being completed	Lecture: Describe the external photoelectric effect Tutorial: Find the wavelength of the radiation emitted by Hydrogen atom during electron transfer from the orbit n to the orbit k	
Work placement	Not applicable	

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