



Subject card

Subject name and code	Physics III, PG_00052080						
Field of study	Nanotechnology						
Date of commencement of studies	October 2020		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	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Beata Bochentyn				
	Teachers		dr inż. Marek Augustyniak dr hab. inż. Beata Bochentyn dr inż. Karolina Górnicka				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: Fizyka III - Moodle ID: 22518 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22518						
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		5.0		60.0	125
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_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_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
	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_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
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 energyMass and energy equivalenceRelativistic relationship between momentum and energyCreation of particlesGeneral theory of relativityBlack body radiationPhotoelectric phenomenonWaves and particles, atomic spectra, Paulie's prohibitionEarly models of the atom, Rutherford's experiment and the beginnings of nuclear physics, the Bohr atomWave equations for photons and electronsAngular momentum, electron spin, periodic tableLasersStable and unstable nuclei, disintegration mechanism, nuclear fission, standard model.Fundamentals of solid state physics		
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	Fizyka III - Moodle ID: 22518 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22518	

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