

SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058706								
Field of study	Materials Engineering, Materials Engineering								
Date of commencement of studies	February 2024		Academic year of realisation of subject			2023/2024			
Education level	second-cycle studies		Subject group			Optional subject group 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	1		Language of instruction			Polish			
Semester of study	1		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład silnie skorelowanych układów elektronowych -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics								
Name and surname	Subject supervisor		dr inż. Michał Winiarski						
of lecturer (lecturers)	Teachers	dr inż. Michał Winiarski							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	0.0	0.0	0.0		0.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes include plan		n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study 30 hours		5.0		15.0 50				
Subject objectives	Acquiring knowledge on the interaction of ionizing radiation with materials								
Learning outcomes	Course outcome Subject outcome Method of verification								
	K7_W05		Knowledge of basic methods, techniques, tools and materials used in solving complex engineering tasks related to the subject.			[SW1] Assessment of factual knowledge			
	K7_K02		Understanding the importance of non-technical aspects and the effects of engineering activities, including its impact on the environment and the related responsibility for decisions			[SK5] Assessment of ability to solve problems that arise in practice			
Subject contents	 Corpuscular - wave dualism; the Heisenberg uncertainty principle. Models of the atom: the Bohr model; atomic spectra; the Schrödinger equation; potential barrier and tunneling effect; Schrödinger's equation for a hydrogen atom. X-rays. The energy of binding the atomic nucleus. Fundamental interactions. Nuclear models: drip, Fermi gas, shell and collective. Radioactive transformations of atomic nuclei. Fission and fusion reactions and their products The interaction of ionizing radiation with matter: photoelectric effect, Compton effect and creation electron-positron pairs. Size and dosimetry units. The effect of ionizing radiation on living matter, materials and devices. Ionizing radiation detectors. Sources of ionizing radiation in the environment. 								
Prerequisites and co-requisites	The course is dedicated to students who have completed the experimental physics course.								
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade			
	Written test		50.0%			80.0%			
	Homeworks		50.0%			20.0%			

Recommended reading	Basic literature	 University physics, Vol. 3. OpenStax, 2016. Available on-line free of charge: https://openstax.org/details/books/university-physics-volume-3 A. Kamal. Nuclear Physics. Berlin-Heidelberg: Springer-Verlag, 2014 			
	Supplementary literature	S.S.M. Wong. Introductory Nuclear Physics. Weinheim, Wiley-VCH, 2004			
	eResources addresses	Adresy na platformie eNauczanie:			
Example issues/ example questions/ tasks being completed	 Adresy na platformie eNauczanie: Corpuscular - wave dualism; the Heisenberg uncertainty principle. Models of the atom: the Bohr model; atomic spectra; the Schrödinger equation; potential barrier and tunneling effect; Schrödinger's equation for a hydrogen atom. X-rays. The energy of binding the atomic nucleus. Nuclear models: drip, Fermi gas, shell and collective. Radioactive transformations of atomic nuclei. Fission and fusion reactions and their products The interaction of ionizing radiation with matter: photoelectric effect, Compton effect and creation electron-positron pairs. Size and dosimetry units. The effect of ionizing radiation on living matter and the human body. Ionizing radiation detectors. Sources of ionizing radiation in the environment. Selected physical methods of medical diagnosis. 				
Work placement	Not applicable				