



Subject card

Subject name and code	Micro- and nanodosimetry, PG_00053320						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study Specialty subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			blended-learning		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			3.0		
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						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Brygida Mielewska				
	Teachers		dr Brygida Mielewska				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	15.0	45
	E-learning hours included: 36.0						
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	4.0		26.0		75
Subject objectives	To present the state of the art of knowledge in the field of ionizing radiation dosimetry in micro- and nanoscale.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems		Student discusses the topics and methods in the group		[SK1] Assessment of group work skills		
	[K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study		student knows and understands selected laws of physics of electromagnetism, nuclear physics and radiobiology		[SW1] Assessment of factual knowledge		
[K7_U02] can perform tasks related to the field of study as well as formulate and solve problems applying recent knowledge of physics and other areas of science		Student solves and presents problems related to the subject on the base of current literature and numerical models		[SU2] Assessment of ability to analyse information			
Subject contents	Lectures: 1. Fundamentals of dosimetry and radiological protection - 3h, 2. Physical characteristic of the beam of ionizing radiation - 1h 3. Interaction of radiation with matter - 4h 4. Damage to biological material 1h 5. Effect of the low-LET beams in material/tissue 2h 6. Effect of the high-LET beams in material/tissue 4h 7. Definitions of microdosimetric quantities - 2h 8. Experimental microdosimetry 4h 9. Microdosimetry in medicine, biology and radiation chemistry - 3h 10. From micro- to nanodosimetry 1h 11. Experimental nanodosimetry - 2h 12. Nanodosimetry in biology - 2h 13. Final test 1h						
Prerequisites and co-requisites	Physics fundamentals						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	oral presentation	50.0%	50.0%
	Written exam or tests	50.0%	50.0%
Recommended reading	Basic literature	H. Rossi, M.Zaider, Microdosimetry and its applications, SpringerVerlag Berlin Heidelberg 1996 Yigal Horowitz, Microdosimetric Response of Physical and Biological Systems to Low- and High-LET Radiations - Theory and Applications to Dosimetry, Elsevier Science 2006	
	Supplementary literature	B. Grosswendt, NANODOSIMETRY, FROM RADIATION PHYSICS TO RADIATION BIOLOGY, Radiation Protection Dosimetry (2005), Vol. 115, No. 14, pp. 19 B. Grosswendt NANODOSIMETRY, THE METROLOGICAL TOOL FOR CONNECTING RADIATION PHYSICS WITH RADIATION BIOLOGY , Radiation Protection Dosimetry (2006), Vol. 122, No. 14, pp. 404414	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Electromagnetic radiation and its spectral ranges 2. Linear - quadratic model 3. Dosimetric quantities vs microdosimetric quantities		
Work placement	Not applicable		

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