



## Subject card

Subject name and code	Nuclear Medicine and Radiotherapy, PG_00053526						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject				2026/2027	
Education level	first-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	3	Language of instruction				Polish	
Semester of study	6	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		Jerzy Nowak				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	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		4.0		26.0	75
Subject objectives	To show the techniques and applications of radioisotopes and ionizing radiation in diagnostics and therapy. To describe mechanisms of interaction of radiation with biologic matter, measurements of beams parameters and its influence in organism.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions	is able to perform typical calculations in the field of radiotherapy and nuclear medicine, performs a critical analysis of the results and formulates conclusions about the possible risks to the patient and staff			[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	knows the applications of ionizing radiation sources in diagnostics and therapy			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE: Radioactive decay and radioisotopes excretion.</p> <p>Radiopharmaceuticals, Manufacturing of radioisotopes,</p> <p>Imaging techniques In nu clear medicine, Physical bases of radiotherapy, Interaction of radiation with matter. Radiobiological bases of radiotherapy, X-lamps for therapeutic applications, Gamma therapy accelerators, Therapeutic accelerators, Dosymetric parameters of photon beam, Beam profile and correcting factors, Patient treatment in radiotherapy, treatment planning, Brachytherapy, Dosymetry in radiotherapy ionizing chambers and other detectors,</p> <p>Bragg-Grays law, Fanos law, Quality insurance in radiotherapy.</p>											
Prerequisites and co-requisites	Physics - elementary course Mathematics - differentials, integrals Chemistry - periodic system of the elements, chemical bonds, types of chemical reactions, Biophysics											
Assessment methods and criteria	<table border="1" data-bbox="448 553 1487 658"> <thead> <tr> <th data-bbox="448 553 794 591">Subject passing criteria</th> <th data-bbox="794 553 1141 591">Passing threshold</th> <th data-bbox="1141 553 1487 591">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 591 794 622">6 written tests during semester</td> <td data-bbox="794 591 1141 622">50.0%</td> <td data-bbox="1141 591 1487 622">50.0%</td> </tr> <tr> <td data-bbox="448 622 794 658">written exam</td> <td data-bbox="794 622 1141 658">50.0%</td> <td data-bbox="1141 622 1487 658">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	6 written tests during semester	50.0%	50.0%	written exam	50.0%	50.0%
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written exam	50.0%	50.0%										
Recommended reading	Basic literature	1. Nałęcz M. (pod red.), Biocybernetyka i inżynieria biomedyczna 2000, t.1 Biosystemy, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2002 2. Nałęcz M. (pod red.), Biocybernetyka i inżynieria biomedyczna 2000, t.2 Biopomiary, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2002 3. Nałęcz M. (pod red.), Biocybernetyka i inżynieria biomedyczna 2000, t.9 Fizyka Medyczna, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2002										
	Supplementary literature	Johns H.E., Cunningham J.R. Physics of Radiology, HC. Thomas Publisher, 1976										
	eResources addresses	Adresy na platformie eNauczanie:										
Example issues/ example questions/ tasks being completed	<p>How does an isotope generator work?</p> <p>Models of cell survival in radiotherapy</p>											
Work placement	Not applicable											

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