



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 2022		Academic year of realisation of subject		2024/2025		
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	LECTURE: Radioactive decay and radioisotopes excretion. Radiopharmaceuticals, Manufacturinf of radioisotopes, 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, preatment planning, Brachytherapy, Dosymetry in radiotherapy ionizing chambers and other detectors, Bragg-Grays law, Fanos law, Quality insurance in radiotherapy.		
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	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%
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	How does an isotope generator work? Models of cell survival in radiotherapy		
Work placement	Not applicable		

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