



Subject card

Subject name and code	Nuclear Medicine and Radiotherapy, PG_00053526						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2023	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	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Zakład Spektroskopii Układów Złożonych -> Instytut Fizyki i Informatyki Stosowanej -> 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	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		
	[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		The student knows and understands the description of the phenomena of radiation interaction with tissues and how they are used in radiotherapy and nuclear medicine		[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation		
	[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		the student is able to perform calculations regarding radiobiological models, radiation sources and radiotherapy and nuclear medicine techniques		[SU1] Assessment of task fulfilment		
Subject contents	LECTURE: Radioactive decay and radioisotopes excretion. Radiopharmaceuticals, Manufacturing of radioisotopes, Imaging techniques in nuclear 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, 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
	written tests	50.0%	50.0%
	written test	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: Medycyna nuklearna i radioterapia 2023/24 - Moodle ID: 37532 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37532	
Example issues/ example questions/ tasks being completed	Single-hit model, linear-quadratic model		
Work placement	Not applicable		