GDAŃSK UNIVERSITY OF TECHNOLOGY

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 dacay and radioisotopes excretion.

Radiopharmaceuticals, Manufacturinf of radioisotopes,

Imaging techniques In nu clear medicine, Physicsal bases of radiotherapy, Interaction of radiation with matter. Radiobiological bases of radiotherapy, X-lamps for therapeutic applications, Gamma therapy accelarators, 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
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	