University of Gdańsk

Subject card

Subject name and code	Radiotherapy and Quality Control in Radiotherapy, PG_00182170						
Field of study	Medical Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2028/2029			
Education level	Bachelor's studies		Subject group	Obligatory subject group in the field of study 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	4.0			
Learning profile	academic		Assessment form	exam			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Joanna Kamińska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		0.0		60.0	120
Subject objectives	Gaining a comprehensive command of the foundational principles of oncology, radiotherapy, and quality assurance in radiotherapy.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMEDL3_U09] Can communicate effectively with colleagues and other employees, works in a team, including interdisciplinary teams, and manages his/her own and his/her colleagues' time appropriately.	The student can effectively communicate with the medical team (physicians, technologists) to optimise radiotherapy plans and verify dose accuracy. The student demonstrates the ability to work in an interdisciplinary team, properly allocating tasks and managing time while performing quality control tests on dosimetric and imaging equipment. The student can clearly present the results of equipment quality control (e.g., simulators, X-ray machines, and computed tomography scanners).	[SU2] presentation/project/paper/ report
	[FIZMEDL3_W07] Knows and understands at an advanced level the concepts of diagnostic and therapeutic methods and their quality control in medical applications.	The student knows: Fundamental concepts in oncology, radiotherapy, and quality assurance in radiotherapy. An overview of cancer epidemiology, major benign and malignant tumours, and methods for treating malignant tumours. The types of ionizing radiation used in radiotherapy. Different types of radiotherapy. The construction and operating principles of equipment used in radiotherapy. Complications in radiotherapy. Radiation protection in radiotherapy. The role of a medical physicist in a radiotherapy department. The principles of dose distribution planning. The principles of quality assurance for equipment in a radiotherapy department. The principles of quality assurance for radiological equipment, as well as the organisational principles of diagnostic labs and their documentation procedures.	[SW4] test/exam - oral or written
	[FIZMEDL3_U05] Can program and use specialised software for calculations and data analysis, including in the field of imaging diagnostics, radiotherapy and biomedical signal analysis.	The student can use specialized software for radiotherapy planning and dosimetric verification. They can analyze measurement data from in-vivo dosimetry, verifying the consistency of delivered doses with the treatment plan. The student can use software to analyze diagnostic imaging data for the verification and correct positioning of the patient.	[SU2] presentation/project/paper/ report

Course outcome	Subject outcome	Method of verification
[FIZMEDL3_K01] He is ready for a critical evaluation of his own knowledge and the information he receives, and understands the need for further education and for improving professional and personal competencies.	The student is prepared to critically evaluate both their own knowledge of radiotherapy and incoming information, aiming to identify errors in dose planning and dosimetry. The student understands and accepts the need for continuous professional development due to the dynamic evolution of technologies such as IMRT and hybrid systems, as well as changing cancer treatment protocols. The student demonstrates a proactive attitude by independently expanding their knowledge of new treatment methods (e.g., stereotaxis, brachytherapy) and their effectiveness and complications. The student is ready to utilise specialised software and scientific literature to verify the accuracy of treatment plans.	[SK4] test/exam - oral or written
[FIZMEDL3_U03] He is able to select and apply appropriate medical equipment to perform selected diagnostic measurements or to carry out basic and specialised tests, and to prepare a report containing a description, analysis, error discussion, and conclusions regarding the results of the studies within the competence of a medical physicist.	The student can: Prepare diagnostic and therapeutic procedures using ionizing and non-ionizing radiation, in accordance with medical indications. Operate radiological equipment. Possess the ability to evaluate and interpret examinations within the scope of a medical physicist's competence.	[SU2] presentation/project/paper/ report

Subject contents

A. Lecture Topics

Fundamentals of Oncology: oncogenesis and carcinogenesis; an overview of cancer epidemiology; major benign and malignant tumors; methods for treating malignant tumors: surgery, radiotherapy, chemotherapy, hormone therapy, and their effectiveness. Treatment types: symptomatic, palliative, and radical.

Radiotherapy: types of ionizing radiation used in radiotherapy; teletherapy, brachytherapy; conventional, megavoltage, and conformal radiotherapy; stereotaxy, IMRT (Intensity-Modulated Radiation Therapy); intraoperative radiotherapy; equipment used in radiotherapy; treatment planning, radiation dose calibration and dosimetry; quality control measurements and in-vivo dosimetry; radiation dose fractionation; the use of medical imaging in radiotherapy planning and delivery; radiotherapy failures and complications; radiation protection in radiotherapy.

Specific Issues: the role of a medical physicist in a radiotherapy department; quality assurance (QA) in radiotherapy: quality control of equipment for teletherapy and brachytherapy, simulators, imaging equipment (X-ray machines, computed tomography scanners, mammography units), and dosimetric devices. Fundamentals of dose distribution planning in radiotherapy planning systems. Dosimetric verification of treatment plans.

B. Laboratory Topics

Performing quality control tests.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
not applicable	51.0%	50.0%
not applicable	51.0%	50.0%

Recommended reading

Basic literature	not applicable
Supplementary literature	not applicable
eResources addresses	

Example issues/ example questions/ tasks being completed

not applicable

Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.