University of Gdańsk

Subject card

Subject name and code	Radiology and Quality Control in Radiology, PG_00182167						
Field of study	Medical Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2027/2028			
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	5		ECTS credits	4.0			
Learning profile	academic		Assessment form	exam			
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr Małgorzata Grzywińska				
	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	The mastery of the physical and instrumental foundations of classic X-ray diagnostics, tomographic techniques, and other modern radiological methods, as well as quality control methods.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 and understands the principles of quality control for radiological equipment. They also know the principles for organising diagnostic laboratories and can verify laboratory documentation.	[SW4] test/exam - oral or written
[FIZMEDL3_W09] Knows at an advanced level the construction and operating principles of measurement instruments, electronic systems, and diagnostic and therapeutic equipment used in physics research and in medical diagnosis and therapy.	The student knows: The physical principles of radiology. The division of modern radiology into disciplines. The construction and principles of operation of X-ray diagnostic and imaging equipment, as well as other devices used in X-ray apparatus, angiographs, ultrasound machines, computed tomography, and nuclear magnetic resonance machines.	[SW4] 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 prepares diagnostic and therapeutic procedures using ionising and non-ionising radiation. The student operates radiological equipment safely for the patient and in accordance with current procedures. The student evaluates and interprets patient test results within the scope of a medical physicist's competence, verifies the correctness of the procedures used, and assesses the quality of the obtained tests. The student establishes the principles for quality control of radiological equipment, proposes and defines the rules for organising diagnostic laboratories, and verifies laboratory documentation. The student establishes the principles of dosimetry and dose measurement, plans radiation protection, and sets criteria for the control of medical equipment parameters.	[SU2] presentation/project/paper/ report
[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 specialised software for analysing data from diagnostic imaging and radiological equipment quality control. They use this software to calculate key parameters and analyse the results of acceptance and routine tests. The student can interpret the data generated by the software to assess image quality and radiological safety.	[SU2] presentation/project/paper/ report
[FIZMEDL3_K02] He is ready to constantly update his knowledge in physics and medical physics to solve cognitive and practical problems independently and to use the opinions and assistance of experts.	Student are prepared to independently and critically evaluate their knowledge of the physical principles of radiology and quality control. They are ready to continuously update their knowledge, using reliable sources and consulting with experts. They possess the ability to solve problems related to the testing of radiological equipment and the interpretation of its results.	[SK2] presentation/project/paper/ report

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 communicate effectively with other medical professionals, both within the radiology team and in an interdisciplinary setting. They understand the importance of collaboration to ensure the correct execution of examinations and the quality of imaging. The student can properly plan and organise their work, and effectively manage their own time as well as that of their colleagues. They are capable of actively participating in discussions and problem-solving, and can clearly and precisely convey information related to radiology and quality control.	[SU2] presentation/project/paper/ report
[FIZMEDL3_U06] Can present in an accessible way the latest achievements in the field of medical physics, the principles of operation of diagnostic and therapeutic equipment and the principles of radiation protection.	The student can explain the course of a diagnostic examination and how to behave during and after the procedure in a simple and understandable manner to the patient, in accordance with the principles of radiological protection.	[SU4] test/exam - oral or written

Subject contents

Fundamentals of Radiology: Physical principles of radiology: The breakdown of modern radiology into its various disciplines, Physical foundations of: classic X-ray diagnostics, contrast-enhanced examinations, ultrasonography, computed tomography (CT), magnetic resonance imaging (MRI), and hybrid imaging equipment, Interventional radiology.

Quality Control in Radiology: Acceptance, baseline, and routine tests, Collimation and alignment, Reproducibility of exposure and dose, Focal spot size tests, Anti-scatter grid tests, Linear distortion tests of the imaging chain, Spatial resolution tests, Control of the chemical processing, Quality of the darkroom and films.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	51.0%	50.0%
raport	51.0%	50.0%

Recommended reading

Basic literature	1) Varghese, A. P. et al. (2024). *A Comprehensive Review of Image Quality Assessment and Optimization Strategies across Imaging Modalities.* PMC 2) Pomiary charakterystyk użytkowych diagnostycznych systemów rentgenowskich cyfrowe systemy obrazowania Zalecenia Polskiego Towarzystwa Fizyki Medycznej 3)Ustawa z dnia 29 listopada 2000 r. Prawo atomowe. (2001). *Dziennik Ustaw*, 2001(3), poz. 18 z późn. zm. 4) Amurao M. et.al., *Quality management, quality assurance, and quality control in medical physics: clarification and guidance* . 2023 5) AAPM Task Group 150. (2024). Acceptance testing and quality control of digital radiographic imaging systems. *AAPM Reports.*
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.