GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Medical Imaging, PG_00047805		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle 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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jerzy Wtorek	
	Teachers	prof. dr hab. inż. Jerzy Wtorek dr Tomasz Neumann	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	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	16.0	64.0	125

Subject objectives

To familiarize students with the construction and principles of operation of the basic equipment used for imaging in medicine.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	The student gained knowledge about the measurement methods used in various imaging techniques for functional and structural diagnosis	[SW1] Assessment of factual knowledge
[K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	The student gained knowledge of the relevant stages of construction of medical images including the theoretical basis of this process	[SW1] Assessment of factual knowledge
[K6_W54] Knows and understands, to an advanced extent, selected aspects of biomedical diagnostics	The student gained knowledge of the various forms of energy and the impact on matter and on living organisms	[SW1] Assessment of factual knowledge
[K6_U53] can apply equipment used in biomedical diagnostics	The student gained skills of distinguishing between image formation modalities	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	1 imaging, basic concepts, PSF, 2 Ultrasound (U.S.), the basic concepts, 3 Mechanical properties of materials (biological), 4. Generation of U.S., measurement, methods, materials, 5 Application of U.S. for measuring flow, methods, 6 . imaging using ultrasound, heads, 7 ultrasound (USG), construction, 8.EM radiation, X, Interaction of X-rays with matter, 9. eneration and measurement of X-ray Camera 10 X-ray, mammography, 11 Fundamentals of X-ray tomography , CT, 12. CT - block diagram, 13. Nuclear Magnetic Resonance, 14 MRI sequences 15 MRI tomograph15. Block diagram 16 MRI - data acquisition, 17 Fundamentals of nuclear medicine , photomultiplier, camera, 18 Isotopes, 19 Collimation and collimators, 20 SPECT, PET 21, 22 Optical imaging, microscopy 23, 24 Endoscopy, 25 Diffusion Optical tomography, 26. Optical coherence tomography, 27. Imaging of sources, 28. impedance tomography, 29. Multimodal imaging, CT-SPECT, CT - PET, MRI - EIT 30. Fundamentals of thermography
Prerequisites and co-requisites	Backgrounds of mathematics and physics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
sprawozdania	60.0%	60.0%
Egzamin	60.0%	40.0%

Recommended reading

Basic literature	J.Moore, G. Zouridakis, Biomedical Technology and devices, CRC Press, 2004 M. Nałęcz [red.] Biocybernetyka i Inżynieria Biomedyczna, t.8. Obrazowanie biomedyczne, Exit 2003 S. Webb, The physics of medical imaging, IOP 1988
Supplementary literature	B.N. Feinberg, Applied clinical engineering, Prentice-Hall, 1986 Enderle [red}, Introduction to biomedical engineering, Elsevier, 2005 Z.-H. Cho, J.P. Jones, M.Singh, Foundations of medical imaging, J.Wiley&Sons, 1993
eResources addresses	Adresy na platformie eNauczanie: Techniki_Obrazowania_Medycznego_2024_25 - Moodle ID: 44196 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44196

Example issues/ example questions/ tasks being completed	1. Describe mechanism of ultrasound wave interaction with matter
Work placement	Not applicable

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