



## Subject card

Subject name and code	Medical Imaging, PG_00050111						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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	1	ECTS credits			3.0		
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		dr inż. Artur Poliński				
	Teachers		dr inż. Artur Poliński dr Tomasz Neumann				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
Obrazowanie medyczne - zima 2022 - Moodle ID: 23633 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23633">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23633</a>							
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	30		3.0		42.0	75
Subject objectives	introduction to selected issues of medical imaging						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W53] Knows and understands, to an increased extent, selected aspects of biomedical diagnostics.		has basic knowledge of various tomographies		[SW1] Assessment of factual knowledge		
	[K7_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions		has basic knowledge of various tomographies		[SU1] Assessment of task fulfilment		
[K7_U53] can apply advanced equipment used in biomedical diagnostics		has basic knowledge of various tomographies		[SU1] Assessment of task fulfilment			
Subject contents	1. Basics of imaging in X-ray tomography 2. Algebraic reconstructions 3. Iterative reconstructions 4. Radon transformation 5. Sinogram 6. Inverse Radon transformation 7. Filtering and filtered back projection 8. Basics of MRI imaging 9. 2D and 3D Fourier imaging in MRI 10. Reconstruction from projection in MRI 11. Multilayer imaging in MRI 12. T1 and T2 weighted images 13. Fast MRI imaging 14. High resolution microscopic and high resolution MRI imaging 15. MRI flow imaging 16. Basics of isotope tomography (SPECT, PET) imaging 17. Maximum likelihood algorithm 18. Correction of attenuation and scattering in tomography						
Prerequisites and co-requisites	There are no requirements						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
			51.0%		50.0%		
			51.0%		50.0%		

Recommended reading	Basic literature	Björck ., Dahlquist G., Metody numeryczne, PWN 1983 Chmielewski L., Kulikowski J.L., Nowakowski A. (red.) Obrazowanie biomedyczne. Biocybernetyka i Inżynieria Biomedyczna 2000, Tom 8, Akademicka Oficyna Wydawnicza Exit 2003 Cho Z.-H., Jones J. P., Singh M., Foundations of Medical Imaging, John Wiley & Sons 1993 Cierniak R., Tomografia komputerowa. Budowa urządzeń CT. Algorytmy rekonstrukcyjne, Akademicka Oficyna Wydawnicza Exit 2005 Cornelis J., An introduction to medical magnetic resonance imaging, VUB, Brussel 1998 Fortuna Z., Macukow B., Wąsowski J., Metody numeryczne, WNT 2006 WNT, 2001 Ralston A., Wstęp do analizy numerycznej, PWN 1983 Stoer J., Bulirsch R., Wstęp do analizy numerycznej, PWN 1987 Tondo  WNT, 2001 Viergever M. A., Todd-Pokropek A., Mathematics and computer science in medical imaging, Springer-Verlag 1988
	Supplementary literature	no
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	