GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern biomedical engineering, PG_00053317		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	2.0
Learning profile	general academic profile	Assessment form	assessment
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 prof. dr hab. inż. Bożena Kostek dr hab. inż. Rafał Piątek dr hab. Paweł Możejko dr inż. Radosław Pomećko dr hab. inż. Ewa Wagner-Wysiecka dr Brygida Mielewska prof. dr hab. inż. Krzysztof Giaro dr hab. Tomasz Wąsowicz dr hab. inż. Piotr Szczuko	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	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	30	2.0	18.0	50

Subject objectives	The aim of the course is to introduce students undertaking IB studies to the basic problems of biomedical engineering and at the same time for students continuing their studies to indicate the directions of currently developed research in the field of broadly understood biomedical engineering. The course covers basic issues related to diagnostics, therapy and support or corrections, illustrated by the latest research achievements already implemented or at the stage of being introduced into clinical practice.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U08] while identifying and formulating engineering tasks specifications and solving these tasks, can: - apply analytical, simulation and experimental methods, - notice their systemic and non-technical aspects, - make a preliminary economic assessment of suggested solutions and engineering work	The student is able to assign to the methods and the techniques discussed during the lecture adequate supporting and computational methods, including simulation, indicating the type of problem and the mathematical method of its description.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
[K7_W08] knows and understands, to an increased extent, the fundamental dilemmas of modern civilisation, the main development trends of scientific disciplines relevant to the field of education	The student understands and is able to justify the importance of the discussed methods and techniques in the development of medical care in society, including the development of diagnostic methods and techniques and therapy support.	[SW2] Assessment of knowledge contained in presentation
[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	On the basis of an objective assessment of the properties of the discussed methods and techniques, the student is able to determine their usefulness and indicate the directions of research work aimed at their improvement.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents

Each year, the scope of the course is determined depending on the current achievements and the composition of the group attending classes. In the 2020/2021 academic year, the course will cover the following topics:1. Modern therapeutic systems, 2. Molecular machines in the service of medicine, 3. Modern materials used in medicine - current state and directions of development, 4. Genetic engineering in biomedical engineering - methods of gene manipulation, 5. Methods of switching genes on and off at the DNA level and RNA, at the level of cells, tissues and organisms, 6. Artificial organs, artificial heart, artificial pancreas. Is there any progress ?, 7. Modern energy sources for implants, 8. Ionizing radiation in biomedical engineering and astrobiology, 9. Achievements in imaging techniques (combined techniques, tomotherapy, etc.), 10. Artificial intelligence in diagnostics and therapy, 11 Auditory and visual perception. 12. Intermodal perception in cognitive and emotional processing of sensory stimuli, 13. Multisensory integration, 14. Human-computer interaction, 15. What is bioinformatics and what are its challenges, 16. Detecting similarities in biological sequences.

Prerequisites and co-requisites

Lecture on basic physics and mathematics. Basic knowledge on anatomy, physiology and pathology.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	100.0%

Recommended reading

Basic literature	Each teacher indicates appropriate literature.
Supplementary literature	Bibliographic databases available for GUT employees and students
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

1. Identify the problems associated with development of joined MRI and PET imaging technique.

Work placement

Not applicable

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