GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronical Medical Equipment I, PG_00047789		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	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	prof. dr hab. inż. Jerzy Wtorek	
	Teachers	prof. dr hab. inż. Jerzy Wtorek	

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	13.0	32.0	75

Subject objectives

To familiarize students with the types and requirements for the medical equipment, especially electronic medical equipment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student gained knowledge of the basic requirements for medical devices	[SW1] Assessment of factual knowledge
[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 on measurement methods needed to understand the principle of medical devices opertion	[SW1] Assessment of factual knowledge
[K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.	The student gained knowledge on requirements and standards obeying medical devices	[SW1] Assessment of factual knowledge
[K6_W54] Knows and understands, to an advanced extent, selected aspects of biomedical diagnostics	The student knows the basic measurement methods used in medical, diagnostic techniques known physiological systems and principles of imaging techniques	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>1 Characteristics of medical equipment (AM) and the conditions to be met by construction of such devices, 2 Basics safety considerations, 3 Sources of electrical signals and their biological characteristics, 4. Electrography and their design, 5. Cell's electrography, 6. ECG - electrodes and measuring systems, 7. Vectorcardiography, 8. Holter equipment and special, 9. Electromyography and plethysmography, 10. Fundamentals of EEG measurement, 11. Problems of electrographic signal analysis, 12. Electroimpedance measurements - ICG, 13. Biomechanical signals measurements, 14. Polygraphs and their applications, 15. Nerve and muscle stimulators, 16. Defibrillators, pacemakers and cardioverter, 17. Spirometry, 18. Audiometry, 19. Intensice Care Medicine, 20. Equipment and screening systems, 21. Apparatus Ultrasound - basics, 22. Ultrasound, 23. Methods of Doppler ultrasound technique, 24. Fundamentals of radiological measurements, 25. X-ray detectors, 26 The concept of tomographic measurements, tomographic scanners types, 28. Magnetography and its applications, 29 Overview of optical diagnostic methods, 30. Development trends in the design of medical equipment</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Backgrounds of physics, mathematics and anatomy</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>60.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Materiały pomocnicze do wykładu i laboratorium, Gdańsk, 2010

M. Nałęcz [red.] Biocybernetyka i Inżynieria Biomedyczna, t.2. Biopomiary, Exit, Warszawa, 2001

J. D. Bronzino [ed.], The Biomedical Engineering Handbook, CRC, 2006</td></tr>
<tr><td>Supplementary literature</td><td>Enderle [red}, Introduction to biomedical engineering, Elsevier, 2005

Pawlicki G., Podstawy Inżynierii Medycznej, OWPW, Warszawa, 1997</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Describe factors determining a safety of medical equipment?</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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