University of Gdańsk

Subject card

Subject name and code	Medical Physics Laboratory, PG_00182172		
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	6	ECTS credits	1.0
Learning profile	academic	Assessment form	credit
Conducting unit	Division of Biomaterials and Medical Physics -> Institute of Experimental Physics -> Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Justyna Strankowska	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15	0.0	15.0	30

Subject objectives	Familiarizing students with the techniques for measuring fundamental quantities in the electrophysiology of the circulatory and respiratory systems, as well as with the basic clinical interpretation of the measured parameters. Introducing students to methods for analyzing the recorded signal using highly specialized software.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[FIZMEDL3_U02] He can perform measurements of physical quantities, prepare, describe, and present the results of physical experiments, including the estimation of measurement uncertainties, and perform quantitative analyses and formulate qualitative conclusions based on them.	The student can perform measurements of physiological quantities such as heart rate, blood pressure, and respiratory signals using specialized equipment. They can develop, describe, and present the results of experiments, for example, from Holter monitoring, including the estimation of measurement uncertainty. They can perform quantitative data analyses and, on this basis, formulate qualitative conclusions regarding the patient's cardiovascular and respiratory status.	[SU1] oral statement/conversation/ discussion [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 specialized software for the analysis of biomedical signals, including QRS complex detection and heart rate variability analysis. They can perform quantitative analyses of ECG signals, systolic blood pressure, and respiratory signals, including the synchronization of this data. They can use software to perform advanced calculations, such as the assessment of baroreceptor function.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[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 effectively communicate with other team members, including physicians, to exchange information and interpret complex study results, such as ECG analysis and signal synchronization. They can work in a team, properly allocating tasks and managing time during the measurement of physiological quantities (e.g., blood pressure, respiration, and heart rate). They can clearly present data analysis results so that other colleagues can easily understand and use them.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[FIZMEDL3_W06] Knows and understands at an advanced level key concepts of human anatomy and physiology, with a particular focus on the physical aspects of biological systems.	The student knows and understands the physical aspects of cardiovascular system function at an advanced level, including the fundamentals of cardiac electrophysiology and phenomena such as the QRS complex. They know and understand the physical basis of the blood pressure regulation mechanism and the importance of analyzing ECG and systolic blood pressure signals in assessing baroreceptor function. They know and understand the relationships between the respiratory signal and heart rhythm, including their synchronization mechanisms.	[SW1] oral statement/ conversation/discussion

	Course outcome	Subject outcome	Method of verification
	[FIZMEDL3_U10] Can independently plan and implement his/her own lifelong learning.	The student can independently search, analyze, and synthesize information on new methods for physiological signal analysis, such as heart rate variability (HRV) analysis and baroreceptor function assessment. They can plan and execute their own research projects, taking into account the specifics of working in a clinical laboratory, such as a Holter monitoring lab. They can independently acquire knowledge about the latest advancements in the field of cardiovascular and respiratory electrophysiology to enhance their skills.	[SU2] presentation/project/paper/ report

Subject contents

This section covers the specifics of working in a clinical laboratory, such as a Holter monitoring lab. It includes a demonstration of techniques for measuring and analyzing ECG using Holter recorders, with a focus on the problem of QRS complex detection. It also covers heart rate variability analysis.

The course will also address techniques for the combined measurement and analysis of multiple physiological parameters, including blood pressure, respiration, and heart rate. Students will learn about the analysis of respiratory and cardiac signals and their synchronization, as well as the analysis of ECG and systolic pressure signals in the assessment of baroreceptor function.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
oral examination	51.0%	20.0%
raport	51.0%	80.0%

Recommended reading

Basic literature	not applicable
Supplementary literature	not applicable
eResources addresses	

Example issues/ example questions/ tasks being completed

not applicable

Work placement

Not applicable

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