

Subject card

Subject name and code	Medical Physics Laboratory, PG_00207556						
Field of study	Medical Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject			2028/2029	
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_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
	[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

	Course outcome	Subject outcome	Method of verification
	[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
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
	raport	51.0%	80.0%
	oral examination	51.0%	20.0%
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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