

Subject card

Subject name and code	Physical Laboratory I - Electromagnetism, PG_00182147						
Field of study	Medical Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group 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	3		ECTS credits		4.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Joanna Gondek				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	60.0	0.0	0.0	60
	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	60		0.0		60.0	120
Subject objectives	Deepening knowledge and understanding of electromagnetic phenomena by conducting laboratory experiments independently and analyzing and interpreting their results.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMEDL3_W09] Knows at an advanced level the construction and operating principles of measurement instruments, electronic systems, and diagnostic and therapeutic equipment used in physics research and in medical diagnosis and therapy.	Student: – knows the measuring equipment used in the study of electromagnetic phenomena and understands how it works.	[SW1] oral statement/ conversation/discussion [SW2] 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 is able to: – plan, coordinate, and conduct research work requiring the cooperation of a group of people, – formulate questions and problems related to the research being conducted; – publicly analyze the results of measurements, observations, and theoretical calculations, – accept critical analysis of their results of measurements, observations, and theoretical calculations, – apply knowledge and methodology of electromagnetism and its experimental methods to related scientific disciplines. – adhere to the principles of professional ethics by performing the tasks assigned to them in a reliable and timely manner.	[SU1] oral statement/conversation/ discussion [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 is able to: – use theoretical knowledge of electromagnetism to conduct experiments in this field of physics; – apply mathematical apparatus to describe and analyze independently obtained experimental data and their uncertainties; – perform a quantitative analysis of the studied phenomenon and formulate qualitative conclusions based on it.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
	[FIZMEDL3_W04] Knows and understands the role of a physical experiment and the elements of the theory of measurement uncertainty.	The student knows and understands: – basic models, quantities, and physical laws of electromagnetism; – the role of physical experiments in understanding the regularities of physical phenomena; – the principles of planning, performing physical experiments, and analyzing their results; – the principles of processing measurement data; – units of physical quantities in electromagnetism; – the structure and operating principles of basic measuring instruments used in physical experiments in electromagnetism; – the basics of numerical analysis and basic application software packages for presenting results and analyzing measurement data.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report
	[FIZMEDL3_U08] Can prepare a written paper or presentation in Polish or English using specialised terminology in the field of physics and medical physics.	The student is able to: – use basic computer software packages to theoretically present an experimentally studied phenomenon, present the obtained measurement data and their analysis.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report

Subject contents	Methods of measuring electromagnetism using electronic techniques. Planning measurements, constructing measurement systems, performing measurements, assessing measurement uncertainty. Experimental investigation of the basic principles of electrical, magnetic, and electromagnetic phenomena:		
	Relaxation oscillations		
	Determination of the electrochemical equivalent of copper and Faraday's constant		
	AC rectification. Greatz circuit		
	RLC resonance circuit (series circuit)		
	Thermocouple calibration		
	Calculation of capacitor capacity using a discharge curve		
	Resistance determination using a Wheatstone bridge		
	Characteristics of a tungsten filament light bulb and a resistance wire heater		
	Study of the phase shift between the current and voltage of alternating current		
	Determining the magnetic field inside a solenoid using a Hall effect sensor		
	Study of the transformer		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	oral responses	51.0%	40.0%
	reports	51.0%	60.0%
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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