University of Gdańsk

Subject card

Subject name and code	Physical Laboratory I - Electromagnetism , PG_00207660						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
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	45.0	0.0	0.0	45
	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	45		0.0		55.0	100
Subject objectives	to deepen students' knowledge and understanding of the fundamental principles underlying physical phenomena by having them independently conduct selected physics experiments in electromagnetism and analyze the results; to demonstrate that physics is a fundamental science for the entire field of natural sciences and technology.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BJORL3_U02] Has the ability to perform measurements of basic quantities used in physics and chemistry; can develop, describe and present the results of simple experiments and computer simulations; can perform quantitative analyses and formulate qualitative conclusions on this basis; can estimate measurement uncertainties.	The student is able to: – present and use knowledge of electromagnetism and thermodynamics in experimental work, – perform a quantitative analysis of the studied physical phenomena in electromagnetism and thermodynamics, – apply mathematical apparatus to describe and analyze physical phenomena in electromagnetism and thermodynamics, – plan and conduct physical experiments in electromagnetism and thermodynamics, – use computer software to analyze and present measurement data, – determine the uncertainty of the measurement data obtained, – draw qualitative conclusions about the phenomenon under study from the experimental results obtained.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
	[BJORL3_K06] Is prepared to make independent decisions, working as part of a team, and taking responsibility for the consequences of his actions.	The student is aware of: – the importance of independent work, – the need to develop the habit of independently seeking solutions to the tasks set before them, – the importance of teamwork, collaborative problem-solving, and seeking the information necessary to solve problems, – the need to adhere to professional ethics by conducting physics experiments and writing reports with integrity.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report
	[BJORL3_W02] Has an advanced understanding of the role of physical and chemical experiments, mathematical theoretical models approximating reality, and computer simulations in scientific research methodology; is aware of technological, apparatus, and methodological limitations in scientific research.	The student knows and understands: – the basic concepts, physical quantities, and laws governing electromagnetic phenomena, – the role of physical experiments in understanding the laws governing electromagnetic phenomena, – experimental limitations in the study of electromagnetic phenomena, – the concept of measurement accuracy; – the construction and operating principles of basic measuring instruments used in experiments on electromagnetism.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report
	[BJORL3_K07] Is ready to think and act entrepreneurially.	The student is aware of: – the importance of independent work, – the need to develop the habit of independently seeking solutions to the tasks set before them.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report
	[BJORL3_U06] Is able to use basic application software packages for presentation of results and data analysis.	The student is able to: – use computer software to analyze and present measurement data, – use computer tools and application software packages to present measurement results in the form of graphs and perform various mathematical operations on measurement data (e.g., linear regression);	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report

Course outcome	Subject outcome	Method of verification
[BJORL3_U09] They are able to plan and carry out their own learning independently, organize their work both individually and in a team, and collaborate with others as part of a team.	The student is able to: – plan and reliably conduct a physics experiment, – complete assigned tasks on time, – plan their own learning, – work in a group to ensure the experiment is conducted correctly, – constructively evaluate and provide feedback on their own work and that of other group members.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[BJORL3_W03] Has advanced knowledge and understanding of the principles of planning and conducting simple physical and chemical experiments and analyzing obtained results; has knowledge and understanding of the fundamentals of measurement uncertainty as applied to experiments, the base SI units and the most important derived units, as well as other systems of units.	The student knows and understands: – the principles of planning and conducting physics experiments, with an emphasis on the study of electromagnetism, – the principles of collecting and analyzing measurement data; – methods for calculating the uncertainty of measurement data; – the units of physical quantities in electromagnetism from various systems of units; – the construction and operating principles of basic measuring instruments used in experiments involving electromagnetism.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report

Subject contents

Measurement methods in electromagnetism using electronic techniques. Measurement planning, construction of measurement systems, conducting measurements, and evaluation of measurement uncertainties. Experimental investigation of the fundamental principles of electrical, magnetic, and electromagnetic phenomena:

relaxation oscillations

determination of the electrochemical equivalent of copper and Faraday’s constant

rectification of alternating current. The Greatz circuit

RLC resonant circuit (series circuit)

calibration of a thermocouple

calculation of capacitor capacitance using the discharge curve

determination of resistance using a Wheatstone bridge

characterization of a tungsten-filament incandescent lamp and a resistance wire heater

investigation of the phase shift between AC current and voltage

determination of the magnetic field inside a solenoid using a Hall effect sensor

transformer testing

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
reports	51.0%	60.0%
oral respoonses	51.0%	40.0%

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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