University of Gdańsk

Subject card

Subject name and code	Electromagnetism, PG_00182293						
Field of study	Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2025/2026			
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	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	6.0			
Learning profile	academic		Assessment form	exam			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Ryszard Drozdowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	45.0	0.0	0.0	0.0	75
	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	75		0.0	75.0	150	
Subject objectives	The aim of the course is to learn: - the laws of electrostatics, - the behavior of free charges in an electromagnetic field, - the laws and effects related to the flow of direct and alternating current, - the relationships between a magnetic field and the currents that generate it, - the mechanism of electromagnetic wave generation, - the principles of operation and applications of various types of electrical devices used in metrology, industry, and everyday life.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZL3_W07] knows and understands electromagnetic phenomena, laws of electrodynamics and the consequences of Maxwell's equations	The student knows: - What methods can be used to electrify bodies and how to store electric charges? - How to generate direct and alternating current and what the effects of current flowing through a given material medium are? - How to generate direct and alternating magnetic fields and what the effects of their interaction with matter are? - What phenomena can be used to measure direct and alternating current? - How a direct and alternating current ammeter and voltmeter, a galvanic cell, a transformer, a DC and AC generator, and an electric motor work? - How to generate and receive electromagnetic waves and how to use them to transmit information.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work
	[FIZL3_U05] can apply the formalism of classical electrodynamics and Maxwell's equation to describe electric and magnetic fields in vacuum and in material media and in electrical circuits, and to classify material media according to the way they interact with an external electromagnetic field	The student is able to: - calculate the intensity of the electric field created by point charges and charges distributed in space, - generate both direct and alternating electric currents and predict the effects of current flow through matter, - generate a magnetic field of a given intensity and predict the effects of this field on moving electric charges, - measure the intensity of electric and magnetic fields using basic measuring instruments, - generate electromagnetic waves.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[FIZL3_W01] has advanced knowledge of physical concepts, principles and theories, understands their historical development and significance not only for physics, but also for other exact and natural sciences and cognition of the world	Students will understand the basic laws of electrostatics and magnetostatics. They will understand the laws of direct and alternating current flow and the importance of electric current for economic development. Furthermore, students will understand how electromagnetic waves are generated and their importance in transmitting information.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW3] text preparation/written work

Subject contents	1. Mathematical introduction - elements of vector analysis and field theory 2. Electric charge. 3. Electric field. 4. Magnetic field. 5. Electrical and magnetic properties of substances. 6. Generation of electric currents. 7. DC and AC circuits. 8. Maxwell's equations in vacuum and matter. 9. Electromagnetic waves 10. Elements of electrical engineering
Prerequisites and co-requisites	A. Formal requirements: passed the course "Mechanics"

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	51.0%	45.0%
student's attitude during classes/ activity	0.0%	5.0%
exam	51.0%	50.0%

Recommended reading	Basic literature	A. K. Wróblewski, J. A. Zakrzewski, Wstęp do fizyki tom 2 część 2, PWN Warszawa 1991; D. Halliday, R. Resnick, J. Walker, Podstawy fizyki Tom III, IV Wyd. Naukowe PWN, Warszawa 2003. J. Orear, Fizyka, Tom II, Wydawnictwo Naukowo-Techniczne, 1979. E. Koziej, B. Sochoń, Elektrotechnika i elektronika, PWN Warszawa 1982. A. Hennel, W. Szuszkiewicz, Zadania i problemy z fizyki, PWN, 1993.

	Supplementary literature	D. J. Griffiths, Podstawy elektrodynamiki, PWN 2012; J. D. Jackson, Elektrodynamika klasyczna, PWN 1982. T. Morawski, W. Gwarek, Pola i fale elektromagnetyczne, Podręczniki Akademickie, Elektronika Informatyka Telekomunikacja 2006. Cz. Bobrowski, Fizyka krótki kurs, Wydawnictwo Naukowo Techniczne Warszawa 1998; W. Hajko, Fizyka w przykładach, WNT, Warszawa 1967;
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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