



Subject card

Subject name and code	Electricity and magnetism, PG_00062714						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024		Academic year of realisation of subject			2024/2025	
Education level	first-cycle 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	1		Language of instruction			Polish none	
Semester of study	1		ECTS credits			6.0	
Learning profile	general academic profile		Assessment form			exam	
Conducting unit	Division of Ceramics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tadeusz Miruszewski				
	Teachers		dr inż. Tadeusz Miruszewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	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		5.0		85.0	150
Subject objectives	The aim of the course is to familiarize students with the basic issues related to electricity and magnetism, with particular emphasis on the application of theoretical aspects in industry.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems		The student has knowledge of issues related to electricity and magnetism with a view to using them in his future professional work			[SW1] Assessment of factual knowledge	
	[K6_K01] is aware of the need to constantly update and enrich knowledge and practical skills, and improve professional, personal and social competences		The student has extended and deepened knowledge of electrostatics, direct current and magnetism			[SK2] Assessment of progress of work	
	[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems		Understands the need to update knowledge regarding electrical and magnetic phenomena.			[SU4] Assessment of ability to use methods and tools	

Subject contents	Electrostatics1. Electric charge2. Electric field3. The concept of electric potential and electric field intensity4. CapacitorsDirect current1. Definitions of physical quantities2. Microscopic description of electric current3. Ohm's law4. Kirchhoff's laws5. Joule-Lenz law6. Elements of electrical circuits7. Elements of electrical engineeringA magnetic field1. Definitions of physical quantities2. Gauss's law for the magnetic field3. Biot-Savart law4. Ampere's law5. Magnetic properties of solidsElectromagnetic induction. AC1. Coil2. Faraday's law of induction3. Lenz's rule4. Mutual and self-induction5. Alternating current - definition of physical quantities6. RLC systems		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	50.0%	50.0%
	Excercises	50.0%	50.0%
Recommended reading	Basic literature	[1] M.Herman, A.Kalestyński, L.Widomski, Podstawy Fizyki dla kandydatów na wyższe uczelnie i studentów, WN PWN, Warszawa [2] J. Massalski, M. Massalska Fizyka dla Inżynierów, WNT Warszawa [3] D.Halliday, R.Resnick, J.Walker, Podstawy Fizyki, PWN, Warszawa [4] Fizyka dla szkół wyższych, Tom 2, wyd. OpenStax Polska	
	Supplementary literature	As above.	
	eResources addresses	Uzupełniające Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Describe Coulomb's law for point charges.Give the definition of electric field intensity, list the types of electric fields with drawings of the fields.Give Gauss's law for the electrostatic field and its application in one selected case.Direct electric current (DC) provide the definition and conditions of flow of electric current.State and explain Ohm's law and Kirchhoff's law in direct current circuits.Describe the magnetic properties of solids.		
Work placement	Not applicable		

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