



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	<p>Electrostatics 1. Electric charge 2. Electric field 3. The concept of electric potential and electric field intensity 4. Capacitors Direct current 1. Definitions of physical quantities 2. Microscopic description of electric current 3. Ohm's law 4. Kirchhoff's laws 5. Joule-Lenz law 6. Elements of electrical circuits 7. Elements of electrical engineering A magnetic field 1. Definitions of physical quantities 2. Gauss's law for the magnetic field 3. Biot-Savart law 4. Ampere's law 5. Magnetic properties of solids Electromagnetic induction. AC 1. Coil 2. Faraday's law of induction 3. Lenz's rule 4. Mutual and self-induction 5. Alternating current - definition of physical quantities 6. RLC systems</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="454 530 794 562">Subject passing criteria</th> <th data-bbox="794 530 1141 562">Passing threshold</th> <th data-bbox="1141 530 1482 562">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="454 566 794 598">Lecture</td> <td data-bbox="794 566 1141 598">50.0%</td> <td data-bbox="1141 566 1482 598">50.0%</td> </tr> <tr> <td data-bbox="454 602 794 633">Exercises</td> <td data-bbox="794 602 1141 633">50.0%</td> <td data-bbox="1141 602 1482 633">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture	50.0%	50.0%	Exercises	50.0%	50.0%
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Example issues/ example questions/ tasks being completed	<p>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.</p>											
Work placement	Not applicable											

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