



## Subject card

Subject name and code	Electrodynamics, PG_00038395						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
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	Part-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Adam Młyński					
	Teachers	dr inż. Adam Młyński dr hab. inż. Jacek Horiszny					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	10.0	0.0	0.0	30
	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	30	8.0		87.0		125
Subject objectives	Understanding the fundamental rights of the electromagnetic field. Description of the different types of fields. Ability to apply the calculation of the electromagnetic field with technical problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_K05	The student is able to assess the influence of the electromagnetic field on living organisms and technical devices. The student knows the dangers associated with strong electromagnetic fields.			[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U04	The student is able to apply the known methods to calculate the electromagnetic field and use peripheral models.			[SU4] Assessment of ability to use methods and tools		
	K6_W02	The student knows how to describe electric and magnetic fields, the student can describe the phenomena occurring in the electric and magnetic fields.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	K6_W03	The student is able to perform engineering calculations of the electromagnetic field and use peripheral models.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Electrostatics: Gauss law, Coulomb's law, electric field and potential, conductor in an electric field, capacitance of various systems covers and pipe, dielectrics, polarization, multilayer dielectrics, electric strength of isolation, Stationary current density field, resistance. Magnetostatics: Ampères law, magnetic flux density, Biot-Savarts law, coefficient of self and mutual inductance, dia-, para- and ferromagnetic, magnetization curve, magnetic circuits, forces. Faradays law, induced and rotational electromotive force.						
Prerequisites and co-requisites	Knowledge of vector algebra. Learn how to calculate derivatives of functions of several variables. Understand the concept of integral linear, surface and volume.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60.0%	50.0%
	Exam during lab	60.0%	50.0%
Recommended reading	Basic literature	<p>Krakowski M: Elektrotechnika teoretyczna. Pole elektromagnetyczne, tom 2. PWN, Warszawa 1992</p> <p>D.J. Griffiths: Podstawy elektrodynamiki. PWN Warszawa 2001r.</p> <p>P.Czarnywojtek i in. Zbiór zadań z elektromagnetyzmu. WU PWSZ Kalisz 2009 r.,</p> <p>Zahn M.: Pole elektromagnetyczne. PWN Warszawa 1989,</p> <p>Sikora R.: Teoria Pola Elektromagnetycznego. WNT, Warszawa 1997  Zimny P.: Wykłady z elektrodynamiki technicznej. <a href="http://www.ely.pg.gda.pl/tiwe">www.ely.pg.gda.pl/tiwe</a>.</p>	
	Supplementary literature	<p>R.P. Feynman, R.B. Leighton, M. Sands: Feynmana wykłady z fizyki (tom II część 1 i 2). PWN Warszawa 2001r.;</p> <p>Sadiku M. : Elements of Electromagnetics. Oxford University Press, 2006</p>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Calculate the electric field intensity distribution of a given system point charges placed at specified points in the cartesian coordinate system.</li> <li>2. Calculate the magnetic field distribution for a cable of a given diameter as a function of distance from the center of the duct.</li> <li>3. Calculate the capacity of single core cables, coaxial cables having a length <math>L = 10</math> km, the wire diameter is <math>d = 30</math> mm, the inner diameter of the screen, <math>D = 30</math> mm and the relative permittivity of the dielectric is <math>\epsilon_w = 3.5</math>.</li> <li>4. Calculate the leakage coaxial cable of length <math>L = 1.5</math> km, the diameter of the vein is <math>d = 30</math> mm, the inner diameter of the screen, <math>D = 40</math> mm, and <math>\sigma</math> is the conductivity isolation = <math>20</math> S / m.</li> <li>5. Calculate the unit inductance own two-wire line, the wires of diameter <math>d</math> spaced apart at a distance <math>h</math>.</li> <li>6. Calculate the force of attraction armature CI</li> </ol>		
Work placement	Not applicable		