



Subject card

Subject name and code	Electrodynamics, PG_00038434						
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					
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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> 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	30.0	15.0	15.0	0.0	0.0	60
	E-learning hours included: 0.0 Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=16952						
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	10.0		55.0		125
Subject objectives	Understanding the fundamental rights of electromagnetic fields. Ability to apply the calculation of the electromagnetic field with technical problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	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_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_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_W03	The student is able to perform engineering calculations of the electromagnetic field and use peripheral models.			[SW1] Assessment of factual knowledge		
Subject contents	Electrostatics: Coulomb's law, Gauss law, electric field and potential, conductor in an electric field, capacitance of various systems lining and wires, dielectrics, polarization, dielectric multilayer, insulation electric strength. Field of the flow current, resistance conductors with different shapes. Magnetostatics: Ampères law, magnetic flux density, Biot-Savarts law, coefficient of self and mutual inductance, dia-, para- and ferromagnetic, mag-netization curve, magnetic circuits, forces. Faradays law, induced and rotational electromotive force, skin and proximity effect.						
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
	Reports on laboratory exercises	60.0%	25.0%
	Midterm colloquium	60.0%	25.0%
	The written examination	60.0%	50.0%
Recommended reading	Basic literature	Zahn M.: Pole elektromagnetyczne. PWN Warszawa 1989 Griffiths D.J.: Podstawy elektrodynamiki. PWN Warszawa 2001 Krakowski M.: <i>Elektrotechnika teoretyczna. Pole elektromagnetyczne, tom 2.</i> PWN, Warszawa 1980 Piątek Z., Jabłoński P.: Podstawy teorii pola elektromagnetycznego. WNT, Warszawa 2010 Sikora R.: Teoria Pola Elektromagnetycznego. WNT, Warszawa 1997 Sikora J., Skoczylas J., Sroka J., Wincenciak S.: Zbiór zadań z teorii pola elektromagnetycznego. Oficyna Wyd. Politechniki Warszawskiej. Warszawa 2004 Zimny P.: Wykłady z elektrodynamiki technicznej. www.ely.pg.gda.pl/tiwe .	
	Supplementary literature	Feynman R.P., Leighton R.B., Sands M.: Feynmana wykłady z fizyki (tom II). PWN Warszawa 2001 Kurdziel R.: Podstawy elektrotechniki. WNT, Warszawa 1965 Rawa H.: Podstawy elektromagnetyzmu. Wydawnictwo Politechniki Warszawskiej	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Calculate the electric field intensity distribution of a given system point charges placed at specified points in the Cartesian coordinate system. 2. What condition should meet the dimensions of the coaxial cable to the maximum intensity of the electric field in the cable was minimal. 3. Calculate the capacity of single core cables, coaxial cables having a length $L = 5$ km, the wire diameter is $d = 30$ mm, the inner diameter of the screen, $D = 40$ mm and the relative permittivity of the dielectric is $w = 3.5$. 4. Calculate the leakage coaxial cable of length $L = 1.5$ km, the diameter of the vein is $d = 30$ mm, the inner diameter of the screen, $D = 40$ mm, and is the conductivity of insulation $= 20 \mu\text{S} / \text{m}$. 5. Calculate the unit inductance own two-wire line, the wires of diameter d spaced apart at a distance h. 		
Work placement	Not applicable		