



## Subject card

Subject name and code	Electrodynamics, PG_00055901						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2022	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	3	Language of instruction				Polish	
Semester of study	5	ECTS credits				2.0	
Learning profile	general academic profile	Assessment form				assessment	
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						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	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	2.0		18.0		50
Subject objectives	Familiarizing students with the phenomena occurring in the electromagnetic field and methods of their description						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W05] has structured knowledge in the field of electrical engineering and electronics, necessary to understand the basics of operation and selection of electrical machines, electricity transmission systems and power electronic devices		Student knows and understands the concepts of: electric voltage, electric current, resistance, self and mutual inductance, electric capacitance, inducing voltages			[SW3] Assessment of knowledge contained in written work and projects	
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems		Student is able to calculate the parameters of electrical systems (resistance, inductance, capacitance), electrodynamic forces, induced voltages.			[SU3] Assessment of ability to use knowledge gained from the subject	
Subject contents	Electrostatics: Coulomb's law, quantities describing the electric field, Gauss's law, Maxwell's laws for electrostatics, electrostatic properties of the environment, electric capacity. Electric flow field: quantities describing the flow field, Maxwell's laws in a conductive environment, electrical properties of the environment, resistance of conductors and earthing. Magnetostatics: Ampere's law, quantities describing the magnetic field, Biot's and Savarte's laws, Maxwell's laws for magnetostatics, self and mutual inductance, magnetic properties of the environment, magnetic circuits, electrodynamic forces. Faraday's law.						
Prerequisites and co-requisites	Knowledge of vector calculus. Ability to calculate derivatives of functions of many variables. Knowledge of the concept of linear, surface and volume integrals.						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
			55.0%			100.0%	
Recommended reading	Basic literature		1. Sadiku M. : Elements of Electromagnetics. Oxford University Press, 2006				
			2.Griffiths D.J.: Fundamentals of Electrodynamics.				
	Supplementary literature		1. Feynman R.P., Leighton R.B., Sands M.: Feynman Lectures on Physics (Volume II)				
	eResources addresses						

Example issues/ example questions/ tasks being completed	1. Calculate the distribution of the electric field strength from the given system of point charges. 2. What condition should the dimensions of the coaxial cable meet so that the maximum electric field strength in the cable is minimal. 3. Calculate the capacitance of a single-core, coaxial cable of length $l$ , whose core diameter is $d$ , the inner diameter of the shield $D$ , and the relative permittivity of the dielectric is, if necessary, $\epsilon_r$ . 4. Calculate the leakage rate of a coaxial cable of length $l$ , whose core diameter is $d$ , the inner diameter of the shield $D$ , and the insulation conductivity is $\sigma$ .
Work placement	Not applicable