



Subject card

Subject name and code	High Voltage Engineering, PG_00038442						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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	2	Language of instruction			Polish none		
Semester of study	4	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Olesz					
	Teachers	dr inż. Daniel Kowalak dr hab. inż. Marek Olesz					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 3748 TECHNIKA WYSOKICH NAPIĘĆ [ET][2025/26] https://enauzanie.pg.edu.pl/2025/course/view.php?id=3748						
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	45	7.0		48.0	100	
Subject objectives	Understanding of phenomena in high voltage insulation systems						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U05	performs basic measurements confirming the electrical strength of the insulation system in a safe manner; selects safe insulation distances; carries out diagnostics of insulation systems			[SU1] Assessment of task fulfilment		
	K6_K01	Student appreciates the importance of self-expanding knowledge in the field of high voltage engineering			[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice		
	K6_W02	understands the phenomena occurring in high-voltage insulation systems			[SW1] Assessment of factual knowledge		

Subject contents	<p>Course content – lecture LECTURE Dielectrics, ionisation processes in gases, forms of discharges, corona, impulse air strength, effect of field distribution, polarity, symmetry, dimensions, time and frequency on electric strength of gases. Compressed gases. Liquid dielectrics, effect of pressure, temperature, humidity, time and frequency, field distribution and electrode dimension on electric strength, applications. Solid dielectrics, mechanisms of breakdown, partial discharges, degradation, dielectric strength of composed insulation systems, surface and gliding discharges. Insulators, application, design, effect of field distribution, pollution and humidity, design of HV power cables and terminations. Lightning, basic parameters, overvoltages, propagation of waves in power lines and windings, principles and methods of lightning protection, co-ordination of insulation. Principles of diagnostics of insulation.</p> <p>Course content – laboratory LABORATORY Measurement of AC, DC and impulse high voltages. Effect of voltage distribution on discharge form in air at AC, DC and impulse voltages. Effect of ambient conditions on electric strength of air. Insulator testing in dry conditions. Oil evaluation, Model investigations of wave phenomena in long lines.</p>		
Prerequisites and co-requisites	acquaintance with principles of differential ordinary and partial equations, integral calculus, theory of electric fields, kinetic-molecular theory of gases, principles of thermodynamics, and structure of atom		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory passing test	60.0%	40.0%
	Written exam	60.0%	60.0%
Recommended reading	Basic literature	Z. Flisowski: "Technika Wysokich Napięć" (HV engineering), WNT Warszawa 1988. Z. Gacek: "Wysokonapięciowa technika izolacyjna" (HV insulation technique), Wydawnictwo Politechniki Gliwickiej, Gliwice 2006. H. Boryń, A. Rynkowski, S. Wojtas: Laboratorium Techniki Wysokich Napięć. Wydawnictwo Politechniki Gdańskiej, 2007. S. Szpor i inni, "Technika wysokich napięć" (HV engineering) WNT, Warszawa, 1978	
	Supplementary literature	H. Mościcka-Grzesiak: Inżynieria wysokich napięć w elektroenergetyce, tom I, Wydawnictwo Politechniki Poznańskiej, Poznań 1996. S. Szpor: Ochrona odgromowa. WNT 1978	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>The streamer mechanism of spark</p> <p>Dielectric loss coefficient</p> <p>Breakdown mechanism of solid materials</p> <p>Breakdown mechanism of liquid dielectrics</p> <p>Measurement of DC high voltages</p> <p>Measurement of AC high voltages</p> <p>Measurement of impulse high voltages</p> <p>The lightning protection of buildings</p> <p>Principles of overvoltage protection for power systems and devices</p>		
Practical activities within the subject	Not applicable		

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