

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Operational safety of electrical devices, PG_00064762								
Field of study	Power Engineering								
Date of commencement of studies	February 2026		Academic year of realisation of subject			2026/2027			
Education level	second-cycle studies		Subject group			Specialty subject group 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			
Semester of study	2		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 -> Wydziały Politechniki Gdańskiej								
Name and surname	Subject supervisor		prof. dr hab. ir	Czapp					
of lecturer (lecturers)	Teachers								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	ct Seminar		SUM	
of instruction	Number of study hours	30.0	0.0	15.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study SL		SUM	
	Number of study 45 7.0			48.0 100					
Subject objectives	To achieve ability of designing and maintenance of electrical devices.								
Learning outcomes	Course outcome Subject outcome Metho					Method of veri	fication		
	[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced detailed knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Power Engineering		Interprets effects of current on human beings. Specifies and explains the means of protection against electric shock in LV systems and HV systems.			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_U02] formulates and tests hypotheses concerning problems related to energy conversion processes, their efficiency, control, safety and impact on the environment, as well as simple research problems		By calculation and measurement estimates effectiveness of protection against electric shock in electrical installations.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools			
	[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving		Assesses the effectiveness of the applied electrical protection systems and indicates methods of rescuing of people.			[SK5] Assessment of ability to solve problems that arise in practice			
	[K7_U01] utilizes acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of energy systems, machines and devices, transmission grids and internal installations		Performs design calculations.			[SU1] Assessment of task fulfilment			

Subject contents	Electrical safety. Health and safety management systems. Occupational risk assessment. Electric shocks. Effects of current on human beings and livestock, threshold of perception, of let-go, of ventricular fibrillation. Electrical impedance of the human body. Touch voltage and body current. Earthing. Earth electrodes, soil resistivity, earthing resistance and their measurement. Earthing resistance calculation. Protection in low voltage installations. Basic protection. Insulation resistance, leakage currents. Protection in case of fault, additional protection. Calculation and testing. Protection in high voltage installations. Earth fault current calculation. Reduction factors related to earth wires and metal sheats. Earthing system for HV installations. Measuring touch voltages. Other hazards. Sources of hazards and protection against electric shock. Earthing in LV systems. Conductivity of floor and wall testing. Effectiveness of protection against electric shock testing in installations with RCDs. Earth loop impedance measurement. Earthing electrode resistance measurement. Conductivity of soil measurement. Insulation resistance measurement.						
Prerequisites and co-requisites							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Lab	100.0%	33.0%				
	Test	50.0%	67.0%				
Recommended reading	Basic literature 1. Czapp S.: Ochrona przeciwporażeniowa w sieciach i instalacjach niskiego napięcia. PWN, Warszawa 2023. 2. Markiewicz H.: Bezpieczeństwo w elektroenergetyce. WNT, Warszawa 2017.						
	Supplementary literature Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa, 2008.						
	eResources addresses						
Example issues/ example questions/ tasks being completed	1. Threshold of let-go for 50 Hz sinusoidal current is:						
	a) around 1-2 mA						
	b) around 5-10 mA						
	c) 30 mA						
	2. A-type residual current devices detect:						
	a) alternating earth fault current and pulsating direct earth fault current						
	b) only alternating earth fault current						
	c) only pulsating direct earth fault current						
	3. Permissible earth potential rise for long duration of current flow in 110/15 kV substation is:						
	a) 80 V						
	b) 160 V						
	c) 50 V						
Work placement	Not applicable						

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