



## Subject card

Subject name and code	Safety of Electrical Equipment Usage, PG_00038422						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021		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	Part-time studies		Mode of delivery		at the university		
Year of study	4		Language of instruction		Polish -		
Semester of study	7		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Stanisław Czapp				
	Teachers						
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	To achieve ability of designing and maintenance of electrical devices in the field of electrical safety						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W12		Student 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		
	K6_K05		Student knows the principles of applying the protection devices and rescue of people.		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U05		Student knows and apply the principles of ergonomics, safety and hygiene at work.		[SU1] Assessment of task fulfilment		
	K6_U11		By calculation and measurement estimates effectiveness of protection against electric shock in electrical installations.		[SU4] Assessment of ability to use methods and tools [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 sheaths. Earthing system for HV installations. Measuring touch voltages. Other hazards. Sources of hazards and protection. Work ergonomics and hygiene. LABORATORY Laboratory model for demonstration of means of 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	Electrical devices						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	67.0%
	Practical exercise	100.0%	33.0%
Recommended reading	Basic literature	1. Czapp S.: Ochrona przeciwporażeniowa w sieciach i instalacjach niskiego napięcia. PWN, Warszawa 2023. 2. Markiewicz H.: Bezpieczeństwo w elektroenergetyce. PWN, WNT, Warszawa 2017.	
	Supplementary literature	1. Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa 2008.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Threshold of let-go for 50 Hz sinusoidal current is:  a) 1 mA  b) 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		