



Subject card

Subject name and code	Protection against electric shock, PG_00061797						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		3.0		
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	15.0	0.0	15.0	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		5.0		40.0	75
Subject objectives	Gaining knowledge about the risk of electric shock and means of protection against electric shock						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
Subject contents	Electric shock. 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. Earthing resistance calculation. Protection in low-voltage installations: basic protection, fault protection, additional protection. Residual current devices. Protection in high-voltage installations. Earthing system for HV installations. Measuring of touch voltages. LABORATORY: Laboratory model for the 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							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Test		50.0%		50.0%		
	Laboratory tasks		100.0%		50.0%		
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		Adresy na platformie eNauczanie:				

<p>Example issues/ example questions/ tasks being completed</p>	<p>1. It is assumed that the threshold of let-go is (for 50 Hz):</p> <p>a) 1 mA</p> <p>b) 10 mA</p> <p>c) 30 mA</p> <p>2. A-type residual current devices detect:</p> <p>a) alternating earth fault current and pulsating direct earth fault current</p> <p>b) only alternating earth fault current</p> <p>c) only pulsating direct earth fault current</p>
<p>Work placement</p>	<p>Not applicable</p>