



Subject card

Subject name and code	Protection Against Electrical Hazards, PG_00042190						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional 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	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	prof. dr hab. inż. Stanisław Czapp dr inż. Kornel Borowski					
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	3.0		42.0	75	
Subject objectives	To achieve ability of designing and maintenance of electrical devices (in basic level).						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U03	Student knows and apply the principles of ergonomics, safety and hygiene at work.			[SU1] Assessment of task fulfilment		
	K6_W05	Student knows the principles of applying the protection devices and rescue of people.			[SW2] Assessment of knowledge contained in presentation		
	K6_W09	The student explains the effects of the flow of electric current through the human body. Lists and discusses means of protection against electric shock in low-voltage and high-voltage systems.			[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Electric risk. 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. Protection in case of fault, additional protection. Protection in high voltage installations. Earthing system for HV installations. Measuring touch voltages. Other hazards. Sources of hazards and protection. Work ergonomics and hygiene.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	Test	50.0%			100.0%		

Recommended reading	Basic literature	<p>1. Czapp S.: Ochrona przeciwporażeniowa w sieciach i instalacjach niskiego napięcia. PWN, Warszawa 2023.</p> <p>2. Jabłoński W.: Ochrona przeciwporażeniowa w urządzeniach elektroenergetycznych niskiego i wysokiego napięcia. WNT, Warszawa 2005.</p> <p>3. Markiewicz H.: Bezpieczeństwo w elektroenergetyce. WNT, Warszawa 2009.</p>
	Supplementary literature	1. Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa, 2008.
	eResources addresses	Adresy na platformie eNauczanie: OCHRONA PRZED ZAGROŻENIAMI ELEKTRYCZNYMI [2023/24] - Moodle ID: 23803 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23803
Example issues/ example questions/ tasks being completed	<p>1. Threshold of let-go for 50 Hz sinusoidal current is:</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>3. Permissible earth potential rise for long duration of current flow in 110/15 kV substation is:</p> <p>a) 80 V</p> <p>b) 160 V</p> <p>c) 50 V</p>	
Work placement	Not applicable	