GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety in the use of electrical equipment, PG_00058363		
Field of study	Hydrogen Technologies and Electromobility		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	4.0
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	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 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

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_K04] can react in abnormal and emergency situations, threats to health and life when using automation and robotics components and systems in hydrogen devices and installations	The 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_U06] has the preparation necessary to work in an industrial environment, applies the principles of occupational health and safety	The student knows and apply the principles of ergonomics, safety and hygiene at work.	[SU1] Assessment of task fulfilment
[K6_W12] knows the hazards from electrical equipment, ways to reduce these hazards, basic principles of health and safety at work with electrical devices, basic principles of ergonomics	The 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

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. 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
	Practical exercise	100.0%	33.0%
	Written exam	50.0%	67.0%
Recommended reading	Basic literature	Czapp S.: Ochrona przeciwporażeniowa w sieciach i instalacjach niskiego napięcia. PWN, Warszawa 2023 Markiewicz H.: Bezpieczeństwo w elektroenergetyce. PWN, WNT, Warszawa 2017.	
	Supplementary literature	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		