GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety of Electrical Equipment Usage, PG_00038422		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2023/2024
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	dr inż. Kornel Borowski prof. dr hab. inż. Stanisław Czapp	

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 basic level)

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U11	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
K6_U05	Student knows and apply the principles of ergonomics, safety and hygiene at work.	[SU1] Assessment of task fulfilment
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_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

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	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: Bezpieczeństwo użytkowania urządzeń elektrycznych [Niestacjonarne] [2023/24] - Moodle ID: 30004 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30004	
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		