GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Operational safety of electrical devices, PG_00064762		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Stanisław Czapp	
	Teachers		

Lesson types

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.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U01] utilizes acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of energy systems, machines and devices, transmission grids and internal installations	Performs design calculations.	[SU1] Assessment of task fulfilment
[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving	Assesses the effectiveness of the applied electrical protection systems and indicates methods of rescuing of people.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U02] formulates and tests hypotheses concerning problems related to energy conversion processes, their efficiency, control, safety and impact on the environment, as well as simple research problems	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
[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced detailed knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Power Engineering	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	Course content – lecture 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	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	50.0%	67.0%
Lab	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. WNT, Warszawa 2017.
Supplementary literature	Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa, 2008.
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Threshold of let-go for 50 Hz sinusoidal current is:

a) around 1-2 mA

b) around 5-10 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

Practical activites within the subject	Not applicable

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