GDAŃSK UNIVERSITY OF TECHNOLOGY

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 2023	Academic year of realisation of subject	2026/2027
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 -> 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	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
[K6_U03] can prepare and present a presentation on the problems and results of an engineering task	Prepares and presents a presentation or report on the problems of protection against electric shock.	[SU5] Assessment of ability to present the results of task
[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	Obtains information from literature, standards, regulations and databases on protection against electric shock in low- and high-voltage devices. In laboratory conditions, it implements a safe electrical circuit.	[SU5] Assessment of ability to present the results of task
[K6_W06] knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, drivers, microprocessor technology, design of simple algorithms and the operation of information networks	Defines the specificity of electronic devices, including computer ones, and their impact on the safety of operators.	[SW1] Assessment of factual knowledge
[K6_W10] has basic knowledge related to mechatronics and robotics systems	Defines threats arising from mechatronics and robotics systems.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
LECTURE:
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.

<table>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
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<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Laboratory tasks</td><td>100.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Czapp S.: Ochrona przeciwporażeniowa w sieciach i instalacjach niskiego napięcia. PWN, Warszawa 2023.

2. Markiewicz H.: Bezpieczeństwo w elektroenergetyce. WNT, Warszawa 2017.</td></tr>
<tr><td>Supplementary literature</td><td>Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa 2008.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. It is assumed that the threshold of let-go is (for 50 Hz):

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</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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