GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	High Voltage Engineering, PG_00038344		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Mechatronics and High Voltage Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Olesz	
	Teachers	dr inż. Daniel Kowalak dr hab. inż. Marek Olesz	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	10.0	0.0	0.0	20
	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	20	5.0	25.0	50

Subject objectives

Understanding the principles of selection and design of high voltage insulation for use in power system

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] has an extended and deepened knowledge of the field related to electrical power systems and electrical equipment	Student identifies basic aging phenomena in insulation systems	[SW1] Assessment of factual knowledge
[K7_U03] is able to obtain information from literature, databases and other sources, also in English, draw conclusions, formulate and fully justify opinions. substantiate opinions; is able to identify directions for further learning and implement the process of self-education	student accepts the need to acquire knowledge from various sources, also in English	[SU2] Assessment of ability to analyse information
[K7_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities	student analyzes the distribution of electrical field in insulation systems, proposes diagnostics of electrical equipment and installations	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Types of exposures of insulation systems in operation conditions, voltage - temporary characterization of overvoltages in power systems, insulation coordination and selection of voltage tests. Insulating distances in air, polluted flashover mechanism and structure of insulators, insulated systems in compressed gases and vacuum. Improving the electrical field distribution in insulation systems. Degradation processes and indicators for a state evaluation of insulation systems, forecasting life time of an insulation. Diagnostics and monitoring of high voltage insulation in a power system. Research of AC test sets; measurements of partial discharges in insulation systems; diagnostic indicators of high voltage insulation systems; model investigations of stand insulators and bushings.

Prerequisites and co-requisites

Credit a subject "High voltage engeneering"

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>60.0%</td><td>60.0%</td></tr>
<tr><td>Practical exercise</td><td>60.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. H. Boryń, M. Olesz, S. Wojtas, Laboratorium TWN II, Skrypt specjalistyczny w wersji elektronicznej, WEiA PG, 2002 2. Mościcka H. (red.): Inżynieria wysokich napięć w elektroenergetyce, Wyd. Pol. Pozn. Tom 1 – 1996, Tom 2 – 1999</td></tr>
<tr><td>Supplementary literature</td><td>1. Flisowski Z. Technika wysokich napięć, WNT, Warszawa, 1988 2. Kosztaluk R. I inni: Technika badań wysokonapięciowych, WNT, Warszawa, 1985 3. Wodziński J.: Wysokonapięciowa technika prób i pomiarów, PWN, 1997</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Time -amplitude characteristics of voltage exposure in the power system,

2. Coordination principles of voltages characterizing the HV system insulation,

3. Static and impulse electric whistand strength of small and large air gaps, time critical front time of voltage impulses,

4. Examples of electric field distribution control of in HV devices,

5. Influence of pressure on the whistand strength of gas type insulation gaps,

6. Electronegative gases and their electrical whistand strength,

7. Basic principles of design of the enclosed switchgear insulation,

8. The probability calculation of sparc and whistand voltages of gas gaps,

9. Surface contamination sparc mechanism, the effect of moisture on the surface strength and the basic principles of construction of petit coats on insulators,

10. The mechanism of gliding discharges and ways to eliminate such discharges in bushings

11. Paper - oil insulation of power transformers for medium voltages and the principles of impregnating the insulation,

12. Construction of capacitors for power systems,

13. The basic structure of modern high voltage cables, joints and terminations.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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