GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	High Voltage Engineering, PG_00049616		
Field of study	Electrical Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-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 Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Olesz	
	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	6.0	14.0	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	- analyzes electrical field distributions in insulation systems, - offers diagnostic tests of power equipment and installations	[SW1] Assessment of factual knowledge
[K7_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities	- performs measurements confirming the electrical strength of the insulation system, - detects ageing processes in insulation using appropriate measurements	[SK5] Assessment of ability to solve problems that arise in practice
[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	- accepts the need to obtain knowledge from various sources, also in English, in order to select measuring equipment and standardization guidelines	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture

Lecture: Analysis of electric field distributions in the vicinity of HV transmission lines - methods of analysis in field programs of the finite element method. Polluted flashover mechanism and structure of insulators. Designing of supporting and bushing systems. Construction of power cable - types of cables and methods of their laying. Designing power cable lines. Degradation processes and indicators for a state evaluation of insulation systems, forecasting life time of an insulation. Types of exposures of insulation systems in operation conditions. Diagnostics and monitoring of high voltage insulation in a power system.

Course content – laboratory

Laboratory: Insulation resistance indicators. Analysis of partial discharges in model systems. Gliding spark test. Testing of overvoltages in the transformer winding. Currents induced in cable conductors. Measurements of the dielectric loss factor with a high-voltage Schering bridge.

Prerequisites and co-requisites	Credit a subject "High voltage engeneering"	
Assessment methods and criteria	Subject passing criteria	Passing threshold / Percentage of the final grade
	Laboratory exercise	60.0% / 40.0%
	Written exam	60.0% / 60.0%
Recommended reading	Basic literature	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
	Supplementary literature	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
	eResources addresses	
Example issues/ example questions/ tasks being completed	Provide limit values for the electric and magnetic field near construction objects located at the HV lines. Methods for limiting the electric field intensity. Discuss the surface contamination sparc mechanism. Give exemplary constructions of support and bushing insulators. Principles of designing support systems Give the constructions of modern HV cables and their accessories. Provide methods and rules for laying power cable lines Provide the rules for designing cable lines. Principles of monitoring the state of HV insulation in the power system Discuss the method of measuring partial discharges Discuss the basic methods of performing voltage tests of insulation systems The lifetime of insulation and its forecasting.	
Practical activites within the subject	Not applicable	

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