GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Exploitation of High Voltage Equipment, PG_00007602		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> 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 inż. Jacek Katarzyński 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	10.0	0.0	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	3.0	27.0	50

Subject objectives	Getting to know the principles of proper operation and diagnostics of the basic components of the power system.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W11	is able to select cabling to conduct measurement work safely	[SW1] Assessment of factual knowledge
K6_W10	The student identifies problems associated with energy processing in the energy system	[SW1] Assessment of factual knowledge
K6_K05	The student understands the hazards arising from the operation of power equipment and knows how to protect against them.	[SK2] Assessment of progress of work
K6_U10	Selects equipment necessary for diagnostic tests	[SU3] Assessment of ability to use knowledge gained from the subject
K6_W09	The student knows the basic principles of proper operation of the essential elements of the power system	[SW1] Assessment of factual knowledge
K6_U09	he student is able to verify, based on visual inspection and measurements, the correctness of the selection of installation components for operation under long-term loads and during short circuits	[SU3] Assessment of ability to use knowledge gained from the subject
K6_K01	The student is able to develop a procedure for diagnostics of electrical power devices and installations in accordance with the requirements of applicable regulations	[SK5] Assessment of ability to solve problems that arise in practice
K6_U05	The student knows the types of work on electrical power devices and knows the basic protective measures necessary when performing them	[SU2] Assessment of ability to analyse information

Subject contents

Types of insulation exposure in operation, voltage - time characteristics of surges, coordination of insulation and selection of test voltages. Indicators for assessing the state of insulation of individual elements of the energy system: transformers, cables, rotating machines, capacitors, insulators, switchgears. Possibilities of assessing the insulation of individual devices used in modern operational practice. Safe work practices with power equipment.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written work	60.0%	50.0%
written exam	60.0%	50.0%

Recommended reading

Basic literature	1. Wodziński J.: Wysokonapięciowa technika prób i pomiarów, PWN, 1997. 2. Praca zbiorowa pod redakcją W. Olecha i M. Kaźmierskiego: Ramowa instrukcja eksploatacji transformatorów, Energopomiar-Elektryka, Gliwice 2006, 3. Florkowska B., Diagnostyka wysokonapięciowych układów izolacyjnych urządzeń elektroenergetycznych, AKADEMIA GÓRNICZO-HUTNICZA IM.STANISŁAWA STASZICA W KRAKOWIE , ISBN: 9788374648332
Supplementary literature	Megger. The complete guide to electrical insulation testing.
eResources addresses	Adresy na platformie eNauczanie: EKSPLOATACJA URZĄDZEŃ WYSOKONAPIĘCIOWYCH [ET][I][Niestacjonarne][2023/24] - Moodle ID: 36114 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36114

Example issues/ example questions/ tasks being completed

1. The types of exposures of insulation systems in operation2. Amplitude and time characteristics of voltage exposures in the power system3. Justify the selection of voltages testing insulation systems in the energy system against the background of electrical exposures occurring in operation4. Principles of coordination of voltages characterizing HV insulation5. Breakdown mechanisms of liquid and solid dielectrics6. Resistive type indicators of HV insulation and measurement methods7. Capacitive type indicators of HV insulation and measurement methods8. The mechanism of partial discharges and their impact on insulation9. Principles of PD measurement - setup, scaling10. Diagnostics of power transformer insulation,11. Transformer oil testing and DGA test12. Cable lines diagnostics13. Possibilities of assessing the insulation of rotating machines 14. Evaluation of insulation of capacitors15. Earthing properties, diagnostic measurements16. Construction and diagnostics of surge arresters

Work placement	Not applicable