GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Testing and Exploitation of Electric Power Equipment, PG_00063904		
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	Specialty subject group 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	2	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		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Daniel Kowalak	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	20.0	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

Familiarization with the requirements, procedures and methods of performing tests of electrical power equipment and devices in accordance with current regulations and standards.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] has an in-depth and structured knowledge of electrical measurements electrical measurements, the methods and equipment used for electrical measurements of non-electrical quantities, he/she knows the principles of testing operation tests of electrical equipment, has a structured knowledge of electricity quality issues	Identifies the type of apparatus and devices and their rated parameters. Plans and develops a programme of the tests new and exploited apparatuses and devices. Calculates the basic parameters of test circuits. Determines the accuracy classes of current and voltage transformers.	[SW3] Assessment of knowledge contained in written work and projects
[K7_K03] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task	Defines the basic types of operational testing of electrical power devices. Explains how to perform tests on the basis of current standards and regulations.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U08] be able to carry out tests on electrical power equipment, analyse disturbances in electrical power systems, record and assess the quality of electricity in the power network	Performs tests of the analyzed devices. Interprets the results of tests and draws conclusions concerning the conducted tests. Appreciates the ability to use measuring instruments. Combines knowledge from different fields.	[SU4] Assessment of ability to use methods and tools

Subject contents	Principle of guidance of laboratory investigations electric apparatuses and electrical devices. High-current testing and switching capacity of electrical apparatus and electrical devices. 3 phase and 1 phase tests. Chosen the exploational investigations of current transformers and voltage transformers. Calculating the basic parameters of testing circuit. Investigations short-circuit (making and breaking) capacity of electrical apparatus and power systems devices. Selection of parameters of measurement systems. The use of digital technology in high-current tests. Measurement errors in the current and voltage transformers. Studies the characteristics of overcurrent circuit breakers.
Prerequisites and co-requisites	Knowledge of the structure and principles of operation of electrical apparatus and electrical devices. Ability to use the standards norms. Knowledge of the items, Electric Circuits, High Voltage Engineering, Electrical Metrology, Electrical Power Engineering, Electrical Devices.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Reports of laboratory exercises	60.0%	40.0%
Midterm colloquium	60.0%	60.0%

Recommended reading

Basic literature	1. Boryń H., Kowalak D., Olesz M.: Laboratorium przekładników indukcyjnych, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011 2. Ciok Z.: Procesy łączeniowe w układach elektroenergetycznych, WNT, Warszawa 1983. 3. Ciok Z., Maksymiuk J., Pochanke Z., Zdanowicz L.: Badanie urządzeń energoelektrycznych, WNT, Warszawa 1992. 4. Maksymiuk J., Pochanke Z.: Obliczenia i badania diagnostyczne aparatury rozdzielczej, WNT, Warszawa 2001 5. Wiszniewski A.: Przekładniki w elektroenergetyce, WNT, Warszawa 1992
Supplementary literature	1. Kacejko P., Machowski J.: Zwarcia w systemach elektroenergetycznych, WNT, Warszawa, 2002 2. Maksymiuk J.: Aparaty elektryczne w pytaniach i odpowiedziach, WNT, Warszawa 1997 3. Markiewicz H.: Urządzenia elektroenergetyczne. WNT, Warszawa 2008 4. Koszmider A., Olak J., Piotrowski Z.: Przekładniki prądowe, WNT, Warszawa 1985 5. Chwaleba A., Poiński M., Siedlecki A.: Metrologia elektryczna, WNT, Warszawa 1979
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

The measurement errors of the current transformer.
1. Present basic types of construction currents and voltages transformers.
2. Why current transformer should work in conditions similar to a short-circuit?
3. What is the current error and phase displacement of current transformer?
4. What is accuracy class of current transformer?
5. In what ranges of currents and burdens the current transformer should maintain its accuracy class?
6. Explain ways to reduce errors in current transformer.

The measurement errors of the voltage transformer.
1. Provide basic constructional types of voltage transformers due to the installation site and the type of the
2. measured voltage.
3. Why the voltage transformer should work in conditions similar to idling?
4. What is the voltage error and phase displacement of voltage transformer?
5. What is accuracy class of voltage transformer?
6. In what ranges of voltages and burdens the voltage transformer should maintain its accuracy class?
7. Explain ways to reduce errors in voltage transformer

The research the time-current characteristics of overcurrent circuit breaker
1. Draw and explain the time-current characteristics of overcurrent circuit breaker? For what purpose is it used?
2. Replace destiny overcurrent circuit breaker with characteristic type B, C, D?
3. Describe the principle of operation of overload release in overcurrent circuit breaker.
4. Describe the principle of operation of instantaneous release in overcurrent circuit breaker.
5. Explain the mechanism of arc extinguishing and cut off the current in the overcurrent circuit breaker.

The short-circuit tests of MV disconnector and earthing switch.
1. What is the rated peak withstand current and rated short-time withstand current of disconnector and
2. earthing switch?
3. What the electrodynamic interactions occur in the disconnector during flow short-circuit current?
4. What the thermal stresses occur in the disconnector during flow short-circuit current?
5. Describe procedure for making short-circuit tests of disconnector or earthing switch.
6. What requirements must be met by disconnecting and earthing switch, which short-circuit tests were passed.

Work placement	Not applicable

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