GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electrical Power Equipment, PG_00062294		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
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	2	ECTS credits	4.0
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	prof. dr hab. inż. Stanisław Czapp	
	Teachers	prof. dr hab. inż. Stanisław Czapp dr inż. Daniel Kowalak dr inż. Kornel Borowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	15.0	0.0	0.0	45

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	45	0.0	0.0	45

Subject objectives

Achieving skills in the principles of operation and selection of electrical power equipment

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U02] is able to use known mathematical and numerical methods to analyze and design elements, systems and power transmission networks and internal installations	The student calculates the load currents and short-circuit currents and, based on them, selects the elements of the power circuit. The student explains the operation of power switches, current and voltage converters.	[SU4] Assessment of ability to use methods and tools
[K7_U07] is able to use basic and advanced knowledge of power equipment operation to assess the technical condition of the power system	The student is able to assess the correct or incorrect operation of electrical equipment. The student is able to prevent emergency situations.	[SU4] Assessment of ability to use methods and tools
[K7_W03] knows advanced aspects of automation and automatic control of power systems or transmission networks and internal installations	The student knows the principles of control of power devices, including in distribution networks and receiving installations.	[SW3] Assessment of knowledge contained in written work and projects
[K7_W04] has advanced, ordered and theoretically grounded knowledge in the field of operation and selection of electrical machines, power transmission systems and power electronic devices, classical and forward-looking power technologies and their receivers, knows the principles of selection of power equipment and installations and their receivers and their operation	The student knows the principles of operation of electrical power devices, as well as the principles of their selection and maintenance.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>LECTURE Current-carrying capacity. Insulation loss-of-life evaluation. Life expectancy curve. Hot-spot temperature, temperature rise. Dynamic behaviour. Rapid heating, continuous heating, heating and cooling cycles. Sustained rating, short-time and cyclic ratings, short-circuit rating. Characteristics of short-circuit currents (scc). Far-from-generator and near-to-generator short-circuit. Initial symmetrical scc, peak scc, breaking scc, thermal equivalent scc. Short-circuit impedances of electrical equipment. Limitation of scc, reactors, current-limiting breaking devices. Selection of equipment according to scc. Electrical switches. Contact configurations, switching arc and quenching technique (vacuum, gas, air). Transient recovery voltage. Selection and operation. Cased switchboards. Fault arc and immunity to fault arc. Limiting of short-circuits effects. Operation. Current and voltage transducers. Current and voltage (inductive) measurement transformers, coreless transducers (capacitive and optical included). Components, equivalent diagrams, operation in normal and overcurrent conditions. Accuracy. Connection systems. Selection and operation. TUTORIAL Calculations of long-term and short-circuit capacity of devices. Calculation of short-circuit currents. LABORATORY Contacts in electric devices. Arc switching. Arcless switching. Low voltage switches. Low voltage fuses. Circuit-breakers. Residual current devices.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written test</td><td>50.0%</td><td>100.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Kacejko P., Machowski J.: Zwarcia w systemach elektroenergetycznych. WNT, Warszawa 2013.

Markiewicz H.: Urządzenia elektroenergetyczne. WNT, Warszawa 2016.

Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa 2008.</td></tr>
<tr><td>Supplementary literature</td><td>Maksymiuk J.: Aparaty elektryczne. WNT, Warszawa 1995.

Wiszniewski A.: Przekładniki w elektroenergetyce. WNT, Warszawa 1992.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Urządzenia elektroenergetyczne [2023/24] - Moodle ID: 34441
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34441</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Calculate peak short-circuit current (ip) for selection the circuit-breaker in a power system.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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