GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power system protection automatics, PG_00057336		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	February 2022	Academic year of realisation of subject	2022/2023
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
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. Zbigniew Lubośny	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	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	8.0	47.0	100

Subject objectives

Understanding the purpose and operating principles of power protection systems. Ability to select power station equipment elements in the field of power protection and automation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 define a set of devices of the power automation system for the correct protection of system elements.	[SU3] Assessment of ability to use knowledge gained from the subject
[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 operation of electric power systems and the ideas of the operation of power security.	[SW2] Assessment of knowledge contained in presentation
[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	Correctly identifies and resolves dilemmas related to systems work electricity in especially related to responsibility for safety for yourself and others.	[SW1] Assessment of factual knowledge
[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 is able to choose the settings of protection relays.	[SU1] Assessment of task fulfilment

Subject contents

The power system as a secured object. The role of security automation and its requirements. Current and voltage transformers for protection. Current transformers and their connection systems. Voltage transformers and their connection systems. Theoretical foundations of protection automation. Analog and digital systems of protection automation. The basic types of protections used: overcurrent, voltage, differential, impedance and angle. Information transfer rules. Medium voltage line protection automatics. Disturbance in the operation of the line. Time delayed overcurrent protection and instantaneous overcurrent protection. Time delayed overcurrent protection with directional block. Differential protection. Protection against earth faults.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="2">Electric power system: structure, principle of operation</td></tr>
<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>Test</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>J. Żydanowicz, M. Namiotkiewicz: Automatyka zabezpieczeniowa w elektroenergetyce. WNT, Warszawa 1983.

W. Winkler, A. Wiszniewski: Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT, Warszawa 1999.

W. Korniluk, K. W. Woliński: Elektroenergetyczna automatyka zabezpieczeniowa. Wydawnictwo Politechniki Białostockiej, Białystok 2008, 2012</td></tr>
<tr><td>Supplementary literature</td><td>B. Synal, W. Rojewski, W. Dzierżanowski: Elektroenergetyczna automatyka zabezpieczeniowa. Of. wyd. Politechniki Wrocławskiej, Wrocław 2003.

R. Kowalik, M. Januszewski, A. Smolarczyk: Cyfrowa elektroenergetyczna automatyka zabezpieczeniowa. Of. wyd. Politechniki Warszawskiej, Warszawa 2006

J. Lorenc: Admitancyjne zabezpieczenia zwarciowe, Wydawnictwo Politechniki Poznańskiej, Poznań 2007</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Calcualte the settings of the delayed and instantaneous overcurrent protection in the HV MV substation.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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