



Subject card

Subject name and code	, PG_00053441						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	4	Language of instruction				Polish	
Semester of study	7	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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Klucznik					
	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	5.0		65.0	100	
Subject objectives	Student recognizes the processes of voltage regulation of the Power system, becomes acquainted with voltage regulation devices and circuits.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_K01	It uses acquired knowledge to systematically learn about new technical solutions.			[SK1] Assessment of group work skills		
	K6_U10	Designs basic voltage regulation systems for synchronous generators and transformers with tap changers.			[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject		
	K6_W10	The issues of electrical traction are not discussed as part of this item.			[SW1] Assessment of factual knowledge		
	K6_U09	Solves technical design issues for various loads.			[SU5] Assessment of ability to present the results of task		
Subject contents	Course content – lecture The criteria and limitations of voltage regulations. Technical limitations, standards. Criteria of regulations. Algorithms and structure of loop control. Algorithms of territorial regulation. Rational/ reasonable loop control structure of voltage levels and distribution of reactive power. Regulators of individual devices: generators, transformers, capacitor banks. Constructions, algorithms, research, starting. integrated control of ARNE and ARST. Superior regulators/integrated controls. Determining the set values for integrated controls.						
	Course content – laboratory Analysis of the voltage and reactive power control system of a synchronous generator. Development of a generator model with an automatic voltage regulator (AVR) in the PowerFactory environment. Analysis of the $U=f(Q)$ characteristic. Investigation of the impact of regulator settings (K_p , K_i). Comparison of different types of algorithms (P, PI, droop control).						
	Analysis of the control system of a transformer with a tap changer. Development of a model containing lines and a transformer in PowerFactory. Simulation of voltage regulation during load changes. Selection of parameters: dead band, delay time, tap step.						
Prerequisites and co-requisites	electrical power engineering, electrical power engineering systems						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	60.0%	40.0%
	Assessment of the laboratory report	60.0%	60.0%
Recommended reading	Basic literature	[1] Kundur P., Power System Stability and Control. McGraw-Hill, Inc. 1994.	
	Supplementary literature	Turan Gonen, Electrical Power Transmission System Engineering: Analysis and Design, Third Edition, CRC Press, 2014 J. D. Glover, M. S. Sarma , T.J. Overbye, Power System Analysis & Design, Cengage Learning, 2011	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>Performing the selection of synchronous generator control system settings.</p> <p>Analysing the operation of a HV/SN transformer controller</p> <p>Discussing types and methods of controlling reactive power sources in the power system</p> <p>Selecting the location of a regulating transformer in the MV network</p>		
Practical activities within the subject	Not applicable		

Document generated electronically. Does not require a seal or signature.