



## Subject card

Subject name and code	Control of Processes in Electrical Power Engineering, PG_00016894						
Field of study	Electrical 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			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 hab. inż. Robert Małkowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	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		15.0	50
Subject objectives	Knowledge related to regulatory processes occurring in the power system.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K7_U02		The student prepares and discusses issues from a given thematic area. Preparation is able to present information in a synthetic way.			[SU2] Assessment of ability to analyse information	
	K7_U03		The student prepares and discusses a given technical problem using the database of scientific publications.			[SU4] Assessment of ability to use methods and tools	
Subject contents	<p>LECTURES: Generator as a regulated object. Generator controllers, limits of operation points for synchronic generators. Influence of automatic control of a tap changing step-up transformer on power capability area of generating unit. Connecting electric power subsystems to parallel running after system breakdown. Defining limits of critical parameters. Relations between basic electric parameters in power grid. Protective Automatic : under-frequency load shedding systems, under-voltage load shedding systems.</p> <p>CLASSES: Coupling parameters of simple power grid model elements( generators, transformers, power lines ) to conduct research including various load level in modelled power grid. Calculating load flow. Characterizing dependencies of voltage and/or transformer tap controllers on voltage levels and load flow in analysed grid.</p>						
Prerequisites and co-requisites	Knowledge of basic electrotechnics Knowledge of basic electrical machinery Knowledge of basic electroenergetics						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Midterm colloquium		50.0%			100.0%	
Recommended reading	Basic literature		1. Hellmann W., Szczerba Z.: Regulacja częstotliwości i napięcia w systemie elektroenergetycznym. Warszawa: WNT 1978. 2. Kożuchowski J.: Sterowanie systemów elektroenergetycznych. Warszawa: PWN 1981. 3. Machowski Jan: Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, 2007.				
	Supplementary literature		1. Kowalik R.: Teletechnika. Podstawy dla elektroenergetyków. Wyd. Politechniki Warszawskiej 1999. 2. J. Machowski, J. Bialek, J. Bumby : "Power System Dynamics and Stability". John Wiley & Sons, Chichester, New York, 1997.				

	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	<p>1. Describe example waveforms (figure below) of switching currents for the case of synchronization with failure to meet the voltage equality condition.</p> <p>2. List the terms of cooperation of a parallel group of generators. Describe the consequences of not meeting these conditions.</p>	
Work placement	Not applicable	