GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power systems operation and control, PG_00057423		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2022/2023
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
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. Ryszard Zajczyk	
	Teachers	dr inż. Piotr Szczeciński prof. dr hab. inż. Ryszard Zajczyk	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	20.0	0.0	0.0	50

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	50	10.0	40.0	100

Subject objectives

To acquaint students with the basic principles of power systems operation, including the processes of voltage and reactive power, frequency and active power regulation.

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	Knowledge of working with the simulator of the operating states of the power system	[SU1] Assessment of task fulfilment
[K7_U07] is able to use basic and advanced knowledge of power equipment operation to assess the technical condition of the power system	Knowledge of the principles of operation of basic devices and systems in the power system	[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	Knowledge of the implementation of the basic processes of active power, frequency, voltage and reactive power regulation in the power system	[SW1] Assessment of factual knowledge
[K7_W02] has extended and deepened knowledge of physics, chemistry, thermodynamics, fluid mechanics, material science, necessary to understand and describe basic thermal and flow phenomena occurring in and around power equipment and systems, transmission networks and internal installations	Verification of the acquired knowledge during laboratory classes	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	Generation of active power in the power system. Active power sources and their characteristics. Turbine regulators. Generation and compensation of reactive power in the power system. Sources of reactive power and their characteristics. Synchronous generators as a regulated source of reactive power. Excitation systems of synchronous generators. Generator regulators. Capacitors and chokes as static reactive power sources. Capacitor bank regulator. Principles of reactive power compensation in transmission and distribution networks. Automatic voltage and frequency regulation in the power system. Frequency regulation in the power system. Primary and secondary regulation. ARCM systems. Voltage regulation in the power system. ARNE and ARST systems.	
Prerequisites and co-requisites		
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	70.0%
	60.0%	30.0%

Recommended reading	Basic literature	1. Machowski J, Białek J.W., Bumby J.,R..: Power system dynamics and stability. John Wiley & Sons New York1997. 2. Kundur P.: Power System Stability and Control. McGraw-Hill, Inc. 1994. 3. Anderson P.M., Fouad A.A.: Power system control and stability IEEE Press Power Engineering Series and John Wiley & Sons, New York 2003.
	Supplementary literature	1. Saccommanno F.: Electric Power Systems Analysis and Control IEEE Press Series on Power Engineering, New York, 2003. 2. Wood A.J., Wollenberg B.F.: Power generation, operation & control John Wiley & Sons, New York 1984. 3. Weedy B.M.: Electric power systems John Wiley & Sons, Chichester 1987
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Wykorzystanie symulatora do analizy pracy systemu elektroenergetycznego	
Work placement	Not applicable	