

关。GDAŃSK UNIVERSITY 创 OF TECHNOLOGY

Subject card

Subject name and code	Mathematical modeling of power systems, PG_00062295								
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 Electri	neering -> Fac	ulty of Electrica	al and C	ontrol Engineering				
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Ryszard Zajczyk						
	Teachers								
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	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 classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study hours	45		0.0		0.0		45	
Subject objectives	To familiarize students with the principles of modeling power facilities and methods of analyzing the operating states of complex power systems such as the power system.								
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		Is able to use his knowledge of the operation of power systems for the purposes of modeling and analyzing their operating states			[SU1] Assessment of task fulfilment			
	[K7_U02] is able to use known mathematical and numerical methods to analyze and design elements, systems and power transmission networks and internal installations		Ability to use numerical methods for the analysis of power systems			[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools			
	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		Learning the principles of selecting basic parameters of objects for modeling purposes			[SW3] Assessment of knowledge contained in written work and projects			
	automatic control of power systems or transmission networks and internal installations		modeling control systems: synchronous generator and power transformer			contained in written work and projects			

Subject contents	Mathematical models of synchronous generators, power turbines, power transformers, power lines.Modeling of active power generation processes in the power system. Models of turbine-generator units. Turbine controller models.Modeling of voltage generation and regulation processes in the power system. Models of excitation systems for synchronous generators and generator controllers. Models of transformers and their control systemsModeling of reactive power generation and compensation processes in the power system. Models generator system.Modeling of power system elements using the PLANS program						
Prerequisites and co-requisites							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Assessment of the report	60.0%	100.0%				
Recommended reading	Basic literature	 Zajczyk R.: Modele matematyczne systemu elektroenergetycznego do badania elektromechanicznych stanów nieustalonych i procesów regulacyjnych. Gdańsk, Wydawnictwo Politechniki Gdańskiej 2003 Zajczyk R.: Regulacja częstotliwości i mocy w systemie elektroenergetycznym. Wer_2014. Wydanie elektroniczne (pdf). Zajczyk R.: Regulacja napięcia i mocy biernej w systemie elektroenergetycznym. Wer_2014. Wydanie elektroniczne (pdf). Zajczyk R.: Regulacja napięcia i mocy biernej w systemie elektroenergetycznym. Wer_2014. Wydanie elektroniczne (pdf). Kacejko P., Machowski J.: Zwarcia w systemach elektroenergetycznych WNT Warszawa 2013. Machowski J.: Regulacja i stabilność systemu elektroenergetycznego, Oficyna wydawnicza Politechniki Warszawskiej., Warszawa 2007. Machowski J, Białek J.W., Bumby J.,R.: Power system dynamics and stability. John Wiley & Sons New York1997. Kundur P.: Power System Stability and Control. McGraw-Hill, Inc. 1994. Saccommanno F.: Electric Power Systems Analysis and Control IEEE Press Series on Power Engineering, New York, 2003 Wood A.J., Wollenberg B.F.: Power generation, operation & control John Wiley & Sons, New York 1984 Weedy B.M.: Electric power systems John Wiley & Sons, Chichester 1987 					
	eResources addresses	Adresy na platformie eNauczanie:	resy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	1. Analysis of power flows in a fragment of the power system.2. Assessment of voltage variability in power system nodes.3. Analysis of the impact of changes in transformer ratio on voltage levels in power networks.						
Work placement							