

SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

Subject card

Subject name and code	, PG_00062827							
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	2		Language of instruction			Polish		
Semester of study	3		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 inż. Marcin Jaskólski					
	Teachers		dr inż. Marcin Jaskólski					
			prof. dr hab. inż. Zbigniew Lubośny					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	30.0	0.0	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		0.0		0.0		30
Subject objectives	The aim of the course is to familiarize students with the concept of a zero-emission energy system, methods of its planning and modeling, and selected power technologies, in particular wind farms.							

Learning outcomes	Course outcome	Subject outcome	Method of verification			
[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		Has extended and deepened knowledge of complex energy systems	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge			
	[K7_U06] is able to apply basic and advanced knowledge of power equipment and transmission network and internal installations to the preliminary design of a modern power plant or part thereof	Can use basic and advanced knowledge of energy devices in wind farms and biogas plants	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			
	[K7_U05] is able to integrate technical and economic analysis of the use of various energy technologies, including technologies using renewable energy sources and conventional and nuclear energy	Can integrate issues of technical and economic analysis into the process of planning the development of zero-emission energy systems	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			
	[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	Has advanced, structured and theoretically based knowledge of wind farms and biogas plants	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge			
Subject contents	PART I. Energy planning - need and essence. Energy systems modeling - methods and tools. Characteristics of selected models of energy systems. Examples of system analyzes in the field of development planning in the energy sector. Complex energy stytems - low- and zero-emission. PART II. Wind energy - development, resources. Calculation of energy resources in a given location for a given type of wind farm. Wind farm structures. Wind farms. Methods of connection to the power system. Power plant and wind farm control. The impact of wind farms on the power system.					
Prerequisites and co-requisites						
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	Presentation of a topic	60.0%	50.0%			
Recommended reading	Basic literature	1. Jaskólski, M. (2023). Modelowanie systemów energetycznych wytwarzania energii elektrycznej i ciepła do celów planowania rozwoju - wybrane zagadnienia. 1-138.				
		2. Lubośny, Z., (2012). Farmy wiatrowe w systemie elektroenergetycznym, PWN				

	Supplementary literature	Lubośny, Zbigniew. Wind Turbine Operation in Electric Power Systems: Advanced Modeling. (2003). Jaskólski, M. (2016). Modelling long-term technological transition of Polish power system using MARKAL: Emission trade impact. <i>ENERGY</i> <i>POLICY</i> , 97, 365-377. https://doi.org/10.1016/j.enpol.2016.07.017 Jaskólski, M., & Bućko, P. (2021). Modelling LongTerm Transition from CoalReliant to LowEmission Power Grid and District Heating Systems in Poland. <i>ENERGIES</i> , 14, 8389. https://doi.org/10.3390/en14248389			
	eResources addresses	Adresy na platformie eNauczanie:			
		https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35853			
Example issues/ example questions/ tasks being completed	1. Milau do uso operativo victores o				
	1. Why do we use energy systems expansion planning?				
	2. Describe the division of energy system modeling tools.				
	3. Characteristics of the selected tool for modeling the expansion of energy systems.				
	4. State energy policy supported by modeling of systems expansion.				
	5. CCS/CCUS systems.				
	6. How do we connect wind farms to the power system?				
	7. Methods of controlling a power plant and a wind farm.				
	8. What impact do wind farms have on the power system?				
	Nat applicable				
Work placement					