



## Subject card

Subject name and code	Smart Grids, PG_00057334						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025		
Education level	second-cycle studies		Subject group		Optional subject group 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	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		prof. dr hab. inż. Zbigniew Lubośny				
	Teachers						
Lesson types and methods of instruction	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		8.0		12.0	50
Subject objectives	Getting acquainted with the idea of Smart Grids (intelligent networks), with their architecture and principles of control and management. Gaining knowledge about designing such networks.						
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		The student is able to design control systems in the intelligent network.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W08] as knowledge about development trends in the field of known technologies and non-technical aspects to solve simple engineering tasks in the field of power systems and equipment or transmission networks and internal installations		The student knows the idea of smart grids, their structure and principles of operation.		[SW1] Assessment of factual knowledge		
	[K7_W10] knows the basic installations of advanced energy systems, transmission networks and internal installations and their impact on the environment		The student is able to design energy storage for the smart grid.		[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		The student is able to design an intelligent network.		[SU1] Assessment of task fulfilment		
Subject contents	Smart Grid Architectural Designs, Smart Grid Communications and Measurement Technology, Performance Analysis Tools for Smart Grid Design, Stability Analysis Tools for Smart Grid, Computational Tools for Smart Grid Design, Pathway for Designing Smart Grid, Renewable Energy and Storage, Interoperability, Standards, and Cyber Security, Research, Case Studies for the Smart Grid						
Prerequisites and co-requisites	Electric power systems						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	60.0%	100.0%
Recommended reading	Basic literature	Buchholz B. M., Styczynski Z. A: Smart grids - Fundamentals and technologies in electricity networks, Springer 2014, 2020Momoh J.: Smart Grid: Fundamentals of Design and Analysis, Wiley-IEEE Press, 2012Borlase S.: Smart Grids: Advanced Technologies and Solutions. 2017	
	Supplementary literature	Any book related to Smart Grids	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Decribe smart grid architecture		
	Voltage control in smart grids		
	Frequ=ency control in smart grids		
Work placement	Not applicable		

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