



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 2023	Academic year of realisation of subject			2023/2024		
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_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		
	[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_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_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		
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, 2020 Momoh J.: Smart Grid: Fundamentals of Design and Analysis, Wiley-IEEE Press, 2012 Borlase S.: Smart Grids: Advanced Technologies and Solutions. 2017
	Supplementary literature	Any book related to Smart Grids
	eResources addresses	
Example issues/ example questions/ tasks being completed	Describe smart grid architecture Voltage control in smart grids Frequency control in smart grids	
Work placement	Not applicable	