



Subject card

Subject name and code	Energy microgrids, PG_00064776						
Field of study	Power Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject				2025/2026	
Education level	second-cycle studies	Subject group				Specialty 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				3.0	
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		dr inż. Krzysztof Dobrzyński				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		7.0		23.0	75
Subject objectives	Achieve knowledge and skills in modeling, control and operation of microgrids.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving		possesses the ability to retrieve information necessary for modeling and analyzing the operation of microgrids. Information is evaluated, pre-verified and corrected as necessary			[SK5] Assessment of ability to solve problems that arise in practice	
	[K7_U01] utilizes acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of energy systems, machines and devices, transmission grids and internal installations		can analyze the conditions for the cooperation of microgrids with electric power systems			[SU3] Assessment of ability to use knowledge gained from the subject	
	[K7_W02] demonstrates structured and theory supported knowledge encompassing key issues in the field of Power Engineering, enabling modeling and analysis of energy systems, machines and devices, transmission grids and internal installations		can model microgrids to ensure energy sufficiency for these grids			[SW3] Assessment of knowledge contained in written work and projects	
Subject contents	Microgrids operating as part of low-voltage networks. Conditions for parallel and islanded operation. Photovoltaic systems. Energy storage. Electric vehicle charging systems. Integration of microgrids with the electric power system. Modeling of microgrids.						
Prerequisites and co-requisites	Basics of electrical engineering.						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Laboratory grade		60.0%			50.0%	
	Written exam		60.0%			50.0%	

Recommended reading	Basic literature	<p>1. Parol M., Mikrosieci niskiego napięcia, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2013</p> <p>2. Markiewicz H.: Instalacje elektryczne. PWN, Warszawa 2018.</p> <p>3. Musiał E.: Instalacje i urządzenia elektroenergetyczne. WSP, Warszawa 2008.</p> <p>4. Wojciechowski H.: Technologie magazynowania energii. Cz. I, Czasopismo Instal numer 2/2017, Wydawnictwo INSTAL</p> <p>5. Wojciechowski H.: Technologie magazynowania energii. Cz. II, Czasopismo Instal numer 3/2017, Wydawnictwo INSTAL</p> <p>6 . Kujszczyk S., Parol M.: Mikrosieci nowe struktury sieci rozdzielczych, Materiały V Konferencji Naukowo-Technicznej Elektroenergetyczne sieci rozdzielcze Sieci 2004, Wrocław, 1517 września 2004.</p> <p>7. Machowski J.: Regulacja i stabilność systemu elektroenergetycznego. Oficyna Wydawnicza Politechniki Warszawskiej, 2007 r.</p>
	Supplementary literature	<p>1. Yun Tiam Tan: Impact on the power system with a large penetration of photovoltaic generation. Dysertacja doktorska, 2004</p> <p>2. Lasseter R., Akhil A., Marnay Ch., Stephens J., Dagle J., Guttromson R., Meliopoulos A.S., Yinger R., Eto J.: White Paper on Integration of Distributed Energy Resources: The CERTS MicroGrid Concept, April 2002</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>The increase in the number of sources generating electricity in the microgrid causes, with respect to the state without generation sources:</p> <p>(a) voltage increase in the grid</p> <p>(b) voltage decrease in the grid</p> <p>(c) remains unaffected by the voltages</p>	
Work placement	Not applicable	

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