GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy microgrids, PG_00064776		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Dobrzyński	
	Teachers	dr inż. Krzysztof Dobrzyński prof. dr hab. inż. Stanisław Czapp	

Lesson types

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

Course content – lecture

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

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