GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy microgrids, PG_00057269		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	February 2022	Academic year of realisation of subject	2022/2023
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	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	dr inż. Krzysztof Dobrzyński prof. dr hab. inż. Stanisław Czapp	

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

Achieving knowledge and skills in the operation and control of energy microgrids.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W10] knows the basic installations of advanced energy systems, transmission networks and internal installations and their impact on the environment	The student knows the principles of power microgrids operation in cooperation with power systems.	[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 knows the principle of operation and design of photovoltaic systems.	[SU2] Assessment of ability to analyse information
[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 analyze the conditions of cooperation of energy micro-grids with power systems.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Power microgrids cooperating with low voltage grids. Island work conditions. Photovoltaic systems. Electric vehicle charging systems. Integration with the low voltage grid. Design and control. Means of protection against electric shock in low voltage power devices.

Prerequisites and co-requisites

Fundamentals of electrical engineering.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	50.0%
Lab evaluation	60.0%	50.0%

Recommended reading	Basic literature	1. Parol M., Mikrosieci niskiego napięcia, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2013 2. Petykiewicz P.: Nowoczesna instalacja elektryczna w inteligentnym budynku. COSiW, Warszawa 2001. 3. Mikulik J.: Europejska Magistrala Instalacyjna. Rozproszony system sterowania bezpieczeństwem i komfortem. COSiW, Warszawa 2008. 4. Klajn A., Bielówka M.: Instalacja elektryczna w systemie KNX/ EIB..Podręcznik INPE dla elektryków, zeszyt 10, czerwiec 2006. 5. Markiewicz H.: Instalacje elektryczne. PWN, Warszawa 2018. 6. Musiał E.: Instalacje i urządzenia elektroenergetyczne. WSP, Warszawa 2008. 7. Project Engineering for EIB Installations. Basic Principles.European Installation Bus Association (EIBA), Brussels, Belgium, 1998.
	Supplementary literature	1. Greacen C., Engel R., Quetchenbach T., A Guidebook on Grid Interconnection and Islanded Operation of Mini-Grid Power Systems Up to 200 kW, Lawrence Berkeley National Laboratory, 2013 2. Lijun He, Zhaobin Wei,Hai Yan, Kang-Yi Xv, Meng-yu Zhao, Shan Cheng, A Day-ahead Scheduling Optimization Model of Multi-Microgrid Considering Interactive Power Control, IGBSG2019, 2019 3. Dan T. Ton, Merrill A. Smith, The U.S. Department of Energys Microgrid Initiative, 2012 Published by Elsevier Inc. 4. Muhammad Hammad Saeed, Wang Fangzong, Basheer Ahmed Kalwar, Sajid Iqbal, A Review on Microgrids Challenges & Perspectives, IEEE Access, 2021
	eResources addresses	
Example issues/ example questions/ tasks being completed	Sample test question: 1. The maximum number of KNX elements in one network segment is: a) 1024 b) 256 c) 64	
Work placement	Not applicable	