GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Smart electrical installations, PG_00065890						
Field of study	Hydrogen Technologies and Electromobility						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2025/2026			
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	6		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	assessment			
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						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	0.0	60
	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	60		6.0	34.0	100	
Subject objectives	The purpose of the course is to teach the student the principles of low-voltage electrical system design with energy storage, renewable energy sources and hydrogen systems. The student will learn how to select the cross-section of conductor and protection for supplying electrical equipment, including with the use of control by the actors of building automation systems.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W17] knows the methods of researching engineering materials, has knowledge in the field of materials science and is able to relate the properties of materials with their structure and composition	Discusses the properties of materials used in energy storage technologies and hydrogen systems.	[SW1] Assessment of factual knowledge
[K6_K02] can work in a group taking on different roles in it	He performs selected project tasks in groups.	[SK2] Assessment of progress of work
[K6_U08] can design and build systems and devices related to automation systems, mechatronics and robotics in energy storage devices and in hydrogen installations	Performs the necessary design calculations for power supply systems of energy storage and hydrogen systems. Makes the necessary schematics of power supply systems.	[SU1] Assessment of task fulfilment
[K6_W13] knows the properties of materials used in the field of hydrogen energy and electromobility	Discusses the properties of materials used in hydrogen technology and vehicle energy storage.	[SW1] Assessment of factual knowledge
[K6_W18] knows the construction and operation of high-temperature fuel cells and electrolysers powered by hydrogen and other fuels and their practical application for energy generation and storage	He knows the principles of creating circuits to power hydrogen systems and energy storage.	[SW1] Assessment of factual knowledge
[K6_W08] has knowledge in the field of energy storage systems: mechanical, thermal, electrical and others, knows the basics of thermodynamics and fluid mechanics, as well as the construction and operation of thermal energy equipment, hydrogen installations, process equipment, including renewable energy sources	Discusses the design and operation of selected energy storage systems, hydrogen systems and renewable energy sources (RES) used in buildings.	[SW1] Assessment of factual knowledge
[K6_U05] can use analytical and simulation methods, prepare and for the formulation and solution of tasks in the field of hydrogen technologies, automation and robotics, electrical engineering, use various techniques to carry out engineering tasks related to electrical devices, hydrogen installations, control and robotics systems	Designs power systems for electrical equipment. Develops operating diagrams of these systems and verifies their correctness.	[SU1] Assessment of task fulfilment
[K6_U12] can formulate a specification of simple engineering tasks of a practical nature related to the field of study	Performs the design process of power supply systems for electrical equipment.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
LECTURE
Tasks and structure of the installation supplying electrical equipment. Tasks and structure of the installation controlling electrical equipment. Main components and requirements. Arrangements of connections. Principles of cable laying. Selection of necessary components. Protection and control. Examples of power and control installation solutions. Selected energy storage technologies. Selected types of hydrogen systems. Selected technologies of renewable energy sources. Electrical safety in installations related to RES and energy storage.

PROJECT
Execution of the design of an installation supplying energy storage or hydrogen installation or renewable energy sources.

LABORATORY
Execution, programming and commissioning of a control system for an installation supplying electrical equipment.

Prerequisites and co-requisites

No requirements.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
LECTURE	60.0%	40.0%
PROJECT	60.0%	30.0%
LABORATORY	60.0%	30.0%

Recommended reading	Basic literature	1. Markiewicz H.: Instalacje elektryczne. WNT, Warszawa, 2007 2. Musiał E.: Instalacje i urządzenia elektroenergetyczne. WSiP, Warszawa, 2008. 3. Petykiewicz P.: Nowoczesna instalacja elektryczna w inteligentnym budynku, COSiW, Warszawa 2001 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. Szymański B., Instalacje fotowoltaiczne, GLOBEnergia, 2020 7. Chmielniak T., Chmielniak T, Energetyka wodorowa, 2020, Wydawnictwo Naukowe PWN
	Supplementary literature	1. 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 2. Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym. Wydawnictwo WNT, 2012. 3. Klugman-Radziemska E.: Praktyczne wykorzystanie energii słonecznej. Artykuł powstały w ramach projektu Odnawialne Źródła Energii Opolszczyzny nr 1/POKL/8.2.1/2008.
	eResources addresses	
Example issues/ example questions/ tasks being completed	In the laboratory, make, programming and start up the control installation of an electrical device.	
Practical activites within the subject	Not applicable	

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