GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Storage of energy, PG_00064763		
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	2.0
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 hab. inż. Marcin Jaskólski	
	Teachers		

Lesson types

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

The aim of the course is to familiarize students with energy storage technologies and methods of their application in balancing energy systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Power Engineering, the structure, principles of operation and evironmental impact of energy systems, machines and devices, transmission grids and internal installations	Planning an energy storage installation for selected initial conditions.	[SW3] Assessment of knowledge contained in written work and projects
[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	Critically evaluates knowledge of energy storage for the purpose of completing a task.	[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	Conducts analysis of the energy storage system using analytical methods.	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Lecture: The need to store energy. Technologies for storing energy. The structure and the use of energy storage systems in energy systems. Rules for the selection of energy storage devices for the purposes of production and consumption balancing. Technical and economic analysis of energy hybrid systems using energy storage.

Laboratory: Electrical energy storage modelling. Energy storage sizing for a selected facility.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Evaluation test</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Text work</td><td>60.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>https://www.sciencedirect.com/science/article/pii/S0196890420308347

https://www.sciencedirect.com/science/article/pii/S2352152X20318351

https://www.sciencedirect.com/science/article/pii/S1364032116308218</td></tr>
<tr><td>Supplementary literature</td><td>https://doi.org/10.3390/en13061402

https://ieeexplore.ieee.org/abstract/document/8580457

https://www.sciencedirect.com/science/article/pii/S2352152X1630010X

https://www.sciencedirect.com/science/article/pii/S1364032118301436

https://www.sciencedirect.com/science/article/pii/S277268352200022X</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Determine the parameters of the energy storage system on the basis of the generation variability data and demand profile.

2. Assign energy storage technologies to the functions they are to perform in energy systems (eg due to the possible capacity and duration of operation).

3. Present the structure of battery energy storage system.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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