



Subject card

Subject name and code	Energy Storage, Methods and Installations, PG_00066993						
Field of study	Smart Renewable Energy Engineering						
Date of commencement of studies	October 2026	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	2	Language of instruction			English		
Semester of study	4	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Division of Manufacturing and Production Engineering -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Aleksander Mroziński					
	Teachers						
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	The aim of the course is to acquire knowledge in the field of energy storage in various forms.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U02] is capable of creating and analyzing digital models of renewable energy systems, including wind power systems, and utilizes digital tools for project analysis, evaluation, supervision, and optimization	The student is able to analyze models of renewable energy systems. Student utilize digital tools in the analysis process.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfillment		
	[K7_K101] acknowledges the importance of knowledge related to the field of study in solving cognitive and practical problems, critically assessing the information obtained	The student understands the importance of energy storage for renewable energy sources Critically evaluates acquired information			[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work [SK3] Assessment of ability to organize work		
	[K7_W02] knows and understands the challenges of effectively integrating decentralized renewable energy generation into the power grid, including energy storage issues, and is particularly familiar with technologies used in wind power	The student knows and understands issues related to energy storage			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	The student identifies different types of energy storage and related installations.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Course content – lecture During the course, knowledge of various forms and methods of energy storage will be presented. Topics covered include: Pumped-storage hydroelectric power plants (PHES); Gravity-assisted hydroelectric power plants (GES); Compressed air storage (CAES); Kinetic energy storage (FES); Liquid air storage (LAES, CES); Chemical energy storage (including hydrogen); Low-, medium-, and high-temperature thermal storage (TES); Electrical energy storage;						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	55.0%	60.0%
	Laboratories	50.0%	40.0%
Recommended reading	Basic literature	1. Energy Storage: Fundamentals, Materials and Applications, A. Huggins, 2015, Springer 2. Energy Storage Systems: Optimization and Applications, VK Mathew, 2023, Springer	
	Supplementary literature	3. Energy Storage Basics: A Study Guide for Energy Practitioners, S. White, 2020	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Write and discuss the formula for the overall efficiency of a PHES power plant. Compare diabatic and adiabatic CAES systems. Why is the energy density of a LAES power plant higher than that of a CAES power plant?		
Practical activities within the subject	Not applicable		

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