GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of energy balances, PG_00055979						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2025/2026			
Education level	first-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	3		Language of instruction	Polish			
Semester of study	6		ECTS credits	2.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Ewa Zaborowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	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		2.0	18.0		50
Subject objectives	The aim of the course is to familiarize students with the theoretical foundations and practical application of the principles of preparing an energy balance for a building, the energy performance of buildings and a selected technological process related to energy conversion, taking into account environmental and economic aspects in the assessment.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] is able to formulate and carry out energy balances in devices and energy systems, also perform an energy audit of a simple building object, is able to perform a preliminary profitability analysis of a planned energy investment	Is able to formulate and carry out an energy balance and perform an energy performance assessment of a selected building	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources	Knows classical and emerging energy technologies, the environmental impact of the technologies used, and ways of using renewable energy sources	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_W07] knows the basics of economic calculus in the energy sector; knows the legal, organizational and economic principles of the functioning of energy markets, knows the basic principles of management and running a business	Knows the basics of economic calculations related to the energy performance of the assessed facility/building	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_U08] can design the basic parameters of the selected technology related to energy conversion and select auxiliary devices and evaluate the project in terms of technical and economic	Is able to select the basic parameters of a selected energy conversion technology and evaluate it from a technical and economic perspective	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture
Basics of preparing an energy balance for a building. Legal regulations related to energy performance and building energy performance certificates. Methodology for calculating energy performance useful/final/primary energy, indicators, and actions aimed at improving energy performance. Basics of energy balance for a selected technological process related to energy conversion.

Course content – exercises
Practical aspects of preparing the energy performance of a building, including non-technical considerations environmental (emissions) and economic (energy costs). Calculations for the energy performance of a building and/or selected technological process related to energy conversion.

Prerequisites and co-requisites

Knowledge of the basics of thermodynamics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	50.0%	20.0%
Tutorials	50.0%	80.0%

Recommended reading

Basic literature	1. Energy policies and strategies related to improving energy efficiency and for energy and climate in the EU and Poland. 2. Legal regulations (directives, acts, regulations) regarding the energy performance of buildings, including calculation methodologies. 3. National plan to increase the number of low-energy buildings, MP of 2015, item 614. 4. Guide to improving the energy performance of buildings, MIiB, 2023.
Supplementary literature	1. Website of the ministry responsible for energy performance and efficiency. 2. Literature related to the topic, including articles in scientific and technical journals.
eResources addresses	

Example issues/ example questions/ tasks being completed

Exercises in calculating the energy performance of a selected building (e.g., residential, collective housing, or public utility building).
Exercises in calculating the energy balance of a selected technological process related to energy conversion (e.g., anaerobic digester with biogas production).

Practical activites within the subject

Not applicable

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