GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy Systems, PG_00049782		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	English
Semester of study	1	ECTS credits	4.0
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. Marcin Jaskólski	
	Teachers	dr inż. Wiktoria Stahl dr inż. Marcin Jaskólski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	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	4.0	36.0	100

Subject objectives

The aim of the course is to provide basic knowledge of the economy and energy systems with particular emphasis on energy technologies.

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		
[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	Student learn the basics of the economic calculation in the energy sector. Recognizes the importance of environmental problems. Familiarizes with the general principles of planning the development of energy systems.	[SW1] Assessment of factual knowledge
[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	Student calculates technical and operational indicators of the energy systems.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents

General information about the role and importance of energy in the country's economy, the size of energy resources and the ways of their use, including the generation structure of the energy system in Poland and in the world. Basic concepts of power and energy, load charts, fuel properties and principles of the economy with different types of fuels. Characteristics of various energy sectors: power system, district heating, energy management in industrial plants as well as in transport and agriculture, and in the municipal economy. Principles of balancing various energy facilities and the principles of rational use of energy. Basics of economic calculus in power engineering. Issues of environmental protection. General rules for planning the development of energy systems.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of the basics of physics (basic physical laws, physical quantities, their units and symbols, mechanics, electrical engineering, thermodynamics, heat transfer). Basic knowledge in mathematics: algebra, geometry and trigonometry, basics of differential and integral calculus.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written / oral exam</td><td>60.0%</td><td>60.0%</td></tr>
<tr><td>Tests during exercises</td><td>60.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Sarkar D., Thermal Power Plant: Design and Operation, Elsevier 2015 (google books view)

Energy Conversion and Management. An International Journal</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">EIA, International Energy Outlook

EIA, Preliminary Monthly Electric Generator Inventory</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:
Energy Systems (GdańskTech, Energy Technologies) [2023/24] - Moodle ID: 28906
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28906</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Draw an example of daily electrical power load curve. Mark characteristic values of power loads (and load layers) on the graph.
2. Draw schematic diagrams of nuclear power plants with PWR and BWR. Describe the devices in each system. What are the main differences between them?
3. Draw a schematic diagram of the gas turbine power plant (operating in a simple Bryton cycle). Describe the devices of the system.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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