GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physical and chemical basis of energy generation, PG_00048791		
Field of study	Green Technologies		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Katarzyna Januszewicz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	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	2.0	28.0	75

Subject objectives

The student becomes acquainted with the subject of obtaining energy from various sources - from conventional to renewable. The course explains the physical and chemical attitudes related to obtaining energy, the efficiency of its conversion and storage, and the calorific value of fuels. In addition, environmental aspects are discussed in relation to the different ways of producing electricity and heat.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K02] is aware of the social role of a technical college graduate, take the reflections on the ethical, scientific and social aspects of the work performed, understands the need to promote, formulating and providing the public with information and opinions concerning the activities of the profession of engineer.	The student can explain the physical and chemical processes related to the production, conversion and storage of energy. Understands the processes related to the production and movement of pollutants related to the energy industry.	[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	The student can explain the physical and chemical processes related to the production, conversion and storage of energy. Understands the processes related to the production and movement of pollutants related to the energy industry	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	The student knows how to calculate the costs of producing energy from various sources and the environmental costs related to the generation, conversion and transmission of energy	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Global and Polish energy market.

Generating energy from conventional sources: coal, oil and natural gas, nuclear energy.

Obtaining energy from renewable sources: solar energy, solar collectors, photovoltaic cells and modules, geothermal energy, heat pumps, wind energy, biomass, biogas.

The greenhouse effect, capture and storage of CO2</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Prerequisites: basic knowledge of mathematics, physics, chemistry, computer science. Completion of the course takes place in accordance with the rules that were announced to the students at the beginning of the semester.</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>Test</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Laboratory</td><td>60.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Bogdanienko J. Odnawialne źródła energii. W-wa PWN 1989
2. Lewandowski W.M. Proekologiczne źródła energii odnawialnej. W-wa WNT 2001
3. Boyle G. Renewable Energy. 2nd ed. New York Oxford University Press Inc. 2004
4. E.Klugmann-Radziemska. Fundamentals of Energy Generation. Wyd. P.G. Gdańsk 2009
5. E.Klugmann-Radziemska. Odnawialne Źródła Energii -Przykłady obliczeniowe.
Wyd. P.G. Gdańsk 2009</td></tr>
<tr><td>Supplementary literature</td><td>1. E.Klugmann-Radziemska E.Klugmann, Systemy słonecznego ogrzewania i zasilania elektrycznego budynków
Wydawnictwo Ekonomia i Środowisko, 2002
2. E.Klugmann, E.Klugmann-Radziemska, Ogniwa i moduły fotowoltaiczne oraz inne niekonwencjonalne źródła energii
Wydawnictwo Ekonomia i Środowisko, 2005</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Enter the principle of operation of the selected power plant. List the advantages and disadvantages of operating a hydro, wind and solar power plant.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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