



Subject card

Subject name and code	, PG_00057787						
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	prof. dr hab. Ewa Klugmann-Radziemska					
	Teachers	dr inż. Anna Kuczyńska-Łażewska prof. dr hab. Ewa Klugmann-Radziemska					
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						
eNauczanie source addresses: Moodle ID: 3137 Physical and chemical basis of energy generation https://enauczanie.pg.edu.pl/2025/course/view.php?id=3137							
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 basis 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.	Student is aware of its contribution to shaping the awareness of the energy economy and its importance for the country and the world	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	[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	Student is able to use the knowledge gained during the lecture (calculation formulas) in order to carry out laboratory exercises and vice versa	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[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	Student knows the formulas and equations needed to calculate the efficiency and performance of various energy sources.	[SW1] Assessment of factual knowledge	
Subject contents	Course content – lecture Global energy market. Generating energy from conventional sources: - coal, oil and natural gas - combustion reactions, thermodynamic cycles in combustion and steam engines - basics of nuclear energy - nuclear fission reaction Obtaining energy from renewable sources: - photovoltaic cells and modules - photovoltaic effect, Ohm's law and two Kirchhoff's laws - heat pumps - thermodynamic cycles - wind energy - the phenomenon of lifting force, the principle of operation of wind turbines - hydropower - conversion of potential energy into kinetic energy, tides, currents - biofuels - biofuel production reactions		
	Course content – laboratory - photovoltaic cells and modules, and installations - heat pumps - wind energy - hydrogen as an energy source - determining the heat of combustion of fuels - insulation materials and energy savings - biofuels - biofuel production reactions		
Prerequisites and co-requisites	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		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	60.0%	50.0%
	Laboratory	60.0%	50.0%
Recommended reading	Basic literature	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 200 5. E. Klugmann-Radziemska. Odnawialne Źródła Energii - Przykłady obliczeniowe. Wyd. P.G. Gdańsk 2009	
	Supplementary literature	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	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Geothermal energy and heat pumps 2. Decentralized energy systems: advantages and disadvantages 3. Thermodynamic cycles, etc.		

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