GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy resource technologies, PG_00069023		
Field of study	Chemical Technology		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
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	5	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Donata Konopacka-Łyskawa	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	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	10.0	35.0	75

Subject objectives

The aim of the course is to familiarize students with the physicochemical properties of energy resources, present technologies for obtaining, processing and converting energy, including alternative fuels and hydrogen, develop environmental awareness and knowledge of economy conditions.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K03] Understands the need for continuous learning and knows the opportunities to improve professional, personal and social competences, and is able to think and act in an entrepreneurial manner.	is ready to continuously improve his/her knowledge in the field of energy raw materials technology and understands the importance of an entrepreneurial approach to the processing of energy raw materials.	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness
[K6_W07] Has knowledge of raw materials and technologies in the chemicaland polymer industries, also covering issues of corrosion and material protection.	has knowledge of the properties and technologies of energy resources.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
- Introduction to energy resources classification, resources, and importance (2h)
- Coal: types, properties, and enrichment methods; combustion, gasification, and pyrolysis technologies (2h)
- Biomass and waste as energy resources: characterization, processing, and combustion (4h)
- Hydrogen: production methods (SMR, electrolysis, biomass gasification), storage, and transport (4h).
- Environmental and economic assessment of energy technologies (2h)
- Directions of energy transformation and development trends (including the hydrogen economy) (1h).

Course content – laboratory
1. Properties of coal and biomass (moisture, ash, calorific value) (3h).
2. Characterization of RDF (3h).
3. Obtaining hydrogen (2x3h) / Obtaining biogas (2x3h).
4. Obtaining hydrogen by electrolysis (3h)

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture - written test	60.0%	50.0%
laboratory (performance of laboratory exercises, tests, reports)	100.0%	50.0%

Recommended reading	Basic literature	1. T. Chmielniak, Technologie energetyczne, PWN, 2021 2. M. Malaczewski, J. Stawska, D. Mowczan, Rynek surowców energetycznych a konkurencyjność gospodarki Polski surowce energetyczne, mix energetyczny, konkurencyjność gospodarki, źródła energii energochłonność ceny energii, Wydawnictwo Uniwersytetu Łódzkiego, 2024 3. B. Kołodziej, M. Matyka, T. Golec, Odnawialne źródła energii: rolnicze surowce energetyczne, Powszechne Wydawnictwo Rolnicze i Leśne, 2012 4. F. Shi, Reactor and process design in sustainable energy technology, Elsevier 2014.
	Supplementary literature	• M. Nowicki, Wodór paliwem przyszłości? PWN 2025 • K. S. V.Santhanam, R. Iosifovič, M. J. Massoud, G. A. Takacs, A. V. Bailey, Introduction to hydrogen technology, Wiley 2018
	eResources addresses	
Example issues/ example questions/ tasks being completed	• How are energy resources classified based on their origin? • What is the difference between primary and secondary resources? • What are the global trends in the consumption of specific fuel types? • What criteria determine the suitability of an energy resource? • Explain the concept of energy efficiency in the context of resource use.	
Practical activites within the subject	Not applicable	

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