



Subject card

Subject name and code	BIOMASS AS A SOURCE OF RENEWABLE ENERGY, PG_00064335						
Field of study	BIOMASA JAKO ŹRÓDŁO ENERGII ODNAWIALNEJ						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group		Optional subject group Specialty 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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		1.0		
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	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The aim of the classes is to supplement knowledge about renewable energy sources, specifically biomass, as well as to learn about processing technologies and modern development trends						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W01] defines the phenomena, processes and laws of nature used to produce consumer goods and provide services		The student is able to describe biomass processing processes, including thermal processing. They classify and describe installations and technological processes that use biomass. They are able to characterize biomass		[SW1] Ocena wiedzy faktograficznej		
	[K7_W05] recognises the key developments in research, apparatus and technology in technology and related fields		The student is able to indicate the latest directions in the development of biomass utilization technologies and describe technological solutions. They know the design of pyrolytic reactors, gasifiers, combustion chambers, and fermentation chambers. They are able to describe a system for hydrogen production from biomass		[SW1] Ocena wiedzy faktograficznej		
	[K7_W04] recognises scientific, technological, organisational and economic opportunities and constraints in technology and related fields		The student is able to indicate the advantages and disadvantages of particular technological solutions. Based on the properties (characteristics) of biomass, they can assess the necessity of selecting preliminary stages and choose appropriate equipment		[SW2] Ocena wiedzy zawartej w prezentacji		

Subject contents	Course content – lecture		
	1. Characteristics of biomass, including waste biomass		
	2. Biomass potential		
	3. Classification of biomass		
	4. Moisture content of biomass. Discussion of the drying process as the most costly and energy-intensive stage		
	5. Main directions of biomass processing: fermentation (biogas), combustion, pyrolysis, gasification		
	6. Discussion of boilers and technologies for conducting combustion, pyrolysis, and gasification processes		
	7. Hydrogen production from biomass. Reforming		
	8. Biochar production from biomass		
	9. Biodiesel vs. bioethanol		
	10. Comparison of waste biomass processing technologies		
	11. Use of biomass in distributed energy sources		
	12. Use of biomass in district heating and industrial energy. Biomass incineration plants		
	Problems and challenges related to biomass properties: overview of biomass shredding and drying equipment. Biomass pelletizing		
	Prerequisites and co-requisites		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	60.0%	100.0%
Recommended reading	Basic literature	1. Lewandowski W.M., Ryms M., Biopaliwa Proekologiczne odnawialne źródła energii, WNT, 2013 2. Werle S. Termiczne przetwarzanie biomasy odpadowej jako element gospodarki obiegu zamkniętego., Monografia, Politechnika Śląska 3. Podkówa W., Biogaz rolniczy, Powszechne Wydawnictwo Rolnicze i Leśne, 2013	
	Supplementary literature	1. Hakeem K.R., Jawaid M., Rashid U., Biomass & Bioenergy, Springer, 2014 2. Hardyman R., Biomass Energy, Cheriton Children's Books, 2022 3. Dahiya A., Bioenergy: Biomass to Biofuels and Waste to Energy, Academic Press, 2014	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Compare the processes of pyrolysis, gasification, and combustion 2. Describe the transesterification process and its applications in industry 3. List the advantages and disadvantages of methane fermentation		
Practical activities within the subject	Not applicable		

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