



## Subject card

Subject name and code	, PG_00065845						
Field of study	Materials Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of New Functional Materials For Energy Conversion -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jakub Karczewski				
	Teachers		dr hab. inż. Jakub Karczewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	10.0	0.0	0.0	10
	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	10		1.0		14.0	25
Subject objectives	The objective of the course is to introduce students to the topic of renewable energy sources, with a specific focus on biomass and biogas. In the laboratory sessions, students will investigate the effectiveness of the catalytic reforming process of synthetic biogas. They will also have the opportunity to independently produce a catalytic material and characterize it, which will enable them to understand the fundamental principles of catalyst operation and their role in the processing of biomass and biogas.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W05] Knows methods, techniques, tools and materials for solving complex engineering tasks relevant to materials engineering.		The student is able to independently conduct an experiment and analyze the results of the catalytic biogas reforming process.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K7_U06] Can evaluate usefulness and feasibility of using new achievements (techniques and technologies) within the scope of materials science.		The student is able to draw conclusions and indicate the experimental parameters that are crucial for the efficiency of the catalytic biogas reforming process.		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	<ul style="list-style-type: none"><li>• Introduction to the subject of biomass and biogas processing</li><li>• Synthesis of catalytic material</li><li>• Testing the efficiency of thermal reforming of biogas</li><li>• Testing the efficiency of catalytic reforming of biogas</li><li>• Analysis and presentation of the obtained results</li></ul>						
Prerequisites and co-requisites	Basic knowledge of chemistry (especially catalysis) and physics (especially fluid mechanics)						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Presentation of the results of theresearch		50.0%		100.0%		

Recommended reading	Basic literature	T. Abbasi, S. M. Tauseef, S. A. Abbasi, "Biogas energy" New York : Springer 2012  A. Wellinger, J. Murphy, D. Baxter, "The Biogas Handbook: Science, Production and Applications" Chantilly: Elsevier Science & Technology 2013
	Supplementary literature	T. Meisam, G. Hossein "Biogas : Fundamentals, Process, and Operation" Cham : Springer International Publishing 2018
	eResources addresses	
Example issues/ example questions/ tasks being completed	Give the biogas reforming reactions. Describe the mechanism of catalytic biogas reforming. Based on the results of measurements of the exhaust gas composition, determine the efficiency of the reforming process. Compare the efficiency of the thermal and catalytic reforming processes.	
Work placement	Not applicable	

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