GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00065845		
Field of study	Materials Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jakub Karczewski	
	Teachers	dr hab. inż. Jakub Karczewski	

Lesson types

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_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.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[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.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

Course content – laboratory

- Introduction to the subject of biomass and biogas processing
- Synthesis of catalytic material
- Testing the efficiency of thermal reforming of biogas
- Testing the efficiency of catalytic reforming of biogas
- Analysis and presentation of the obtained results

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.	
Practical activites within the subject	Not applicable	

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