

## GDAŃSK UNIVERSITY

## Subject card

Subject name and code	Fuel cells and low temperature electrolysers, PG_00058352								
Field of study	Hydrogen Technologies and Electromobility								
Date of commencement of studies	October 2022		Academic year of realisation of subject			2023/2024			
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study			
						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			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department of Corrosion and Electrochemistry -> Faculty of Chemistry								
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Łukasz Gaweł							
	Teachers dr inż. Łukasz Gaweł								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	15.0	0.0	30.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	ic Participation in udy consultation hours		Self-study S		SUM	
	Number of study hours	45		8.0		72.0		125	
Subject objectives	The aim of the course is to familiarize students with low-temperature electrolysers and fuel cells.During the course, students will become familiar with the construction of cells and electrolyzers.They learn the principles of operation and the impact of operating parameters on the efficiency of fuel cells, i.e. temperature, flow rate, humidification.They will become familiar with basic measurement techniques for evaluating fuel cells performance.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_U02] can work individually and in a team, can communicate using various techniques in a professional environment, as well as document and analyze the results of their work, can estimate the time needed to perform the entrusted task		Student is able to use measurement techniques and solve problems related to fuel cells and electrolyzers.			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information			
	[K6_W21] has knowledge in the field of construction, principles of operation and use of electrochemical energy sources		Student is able to identify individual elements of a low- temperature fuel cell. Is able to describe the principle of operation and areas of application of low- temperature fuel cells.			[SW1] Assessment of factual knowledge			
	[K6_W20] has knowledge in the field of construction, principles of operation and use of electrolysers		Student is able to identify individual elements of the electrolyzer. Is able to describe the principle of operation and areas of application of low- temperature electrolysers.			[SW1] Assessment of factual knowledge			

Subject contents	Basics of construction of low-temperature electrolysers and fuel cells.Electrode reactions, cell emfTypes of losses in low-temperature cells and electrolysersThe influence of temperature and pressure on the operation of cells.Basic measurement techniques for assessing the properties of electrolyzers and low-temperature cells.Application of low-temperature cells and electrolysers.					
Prerequisites and co-requisites	Knowledge of the basics of electrochemistry and technical electrochemistry.Knowledge of the basics of electrical engineering.					
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	Lectures	60.0%	40.0%			
	Laboratory	60.0%	60.0%			
Recommended reading	Basic literature	1. J. Larminie, A. Dicks ,,Fuel cell systems explained, Willey, 2003. 2. K. Kordesh, G. Simader ,,Fuel cells and their applications, VCH, 2001				
	Supplementary literature	1. P. W. Atkins: "Chemia fizyczna", PWN, Warszawa 2001.				
	eResources addresses	Adresy na platformie eNauczanie: OGNIWA PALIWOWE I ELEKTROLIZERY NISKOTEMPERATUROWE - Moodle ID: 36954 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36954				
Example issues/ example questions/ tasks being completed	The influence of temperature on cell efficiencyThe influence of reactant flow rates on efficiency.Describe the current-voltage curve of the cell.Write down the reactions taking place in the electrolyzer/cell					
Work placement	Not applicable					

Document generated electronically. Does not require a seal or signature.