GDAŃSK UNIVERSITY OF TECHNOLOGY

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 2024	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Corrosion and Electrochemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Łukasz Gaweł	
	Teachers	dr inż. Łukasz Gaweł	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 4105 OGNIWA PALIWOWE I ELEKTROLIZERY NISKOTEMPERATUROWE 2026
https://enauczanie.pg.edu.pl/2025/course/view.php?id=4105

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	45	8.0	72.0	125

Subject objectives

The course aims to introduce students to electrolyzers and low-temperature fuel cells. Students will become familiar with the design of cells and electrolyzers. They will learn the operating principles and the impact of operating parameters on fuel cell performance, such as temperature, flow rate, and humidification. They will also become familiar with basic measurement techniques for fuel cell evaluation.

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	Able to use measurement techniques and solve problems related to fuel cells and electrolyzers.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_W21] has knowledge in the field of construction, principles of operation and use of electrochemical energy sources	Student is able to identify the individual components of a low-temperature fuel cell. Is able to describe the operating principle and application areas 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	Is able to identify the individual elements of an electrolyzer. Is able to describe the operating principle and application areas of low-temperature electrolyzers.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Basics of low-temperature electrolyzer and fuel cell design. Electrode reactions and cell.. Types of losses in low-temperature electrolyzers and fuel cells. The effects of temperature and pressure on cell performance. Basic measurement techniques for assessing the properties of low-temperature electrolyzers and fuel cells. Applications of low-temperature electrolyzers and fuel cells.
Course content – laboratory
Basics of low-temperature electrolyzer and fuel cell design. Electrode reactions of hydrogen and oxygen evolution, cell EMF. Types of losses in low-temperature cells and electrolyzers. Effect of temperature on cell operation. Effect of flow rate on cell efficiency. Basic measurement techniques for assessing the properties of low-temperature electrolyzers and cells. Applications of low-temperature cells and electrolyzers.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of electrochemistry and technical electrochemistry. Basic knowledge of electrical engineering.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Lecture</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. J. Larminie, A. Dicks ,,Fuel cell systems explained, Willey, 2003.
2. K. Kordesh, G. Simader ,,Fuel cells and their applications, VCH, 2001</td></tr>
<tr><td>Supplementary literature</td><td>1. P. W. Atkins: ,,Chemia fizyczna", PWN, Warszawa 2001.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Effect of temperature on cell efficiency
Effect of reactant flow rate on efficiency.
Describe the current-voltage curve of the cell.
Describe the reactions occurring in the electrolyzer/cell</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
</table>

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