GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern materials in environmental electrochemistry, PG_00072669		
Field of study	Chemical Technology, Chemistry, Biotechnology, Engineering and Technologies of Energy Carriers, Corrosion , Green Technologies, InfoBioChem		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
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 inż. Anna Dettlaff	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	12.0	0.0	18.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 5989 Nowoczesne materiały w elektrochemii środowiskowej
https://enauczanie.pg.edu.pl/2025/course/view.php?id=5989

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	30	2.0	18.0	50

Subject objectives

The aim of the course is to familiarise students with electrochemical techniques used in environmental protection, with particular emphasis on the role of advanced materials, as well as their applications and limitations.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U02] carries out experiments using properly selected techniques and apparatus, taking advantage of new developments in technology and related fields	Is able to select appropriate electrochemical techniques and advanced electrode materials to address problems related to the detection of environmental pollutants, hydrogen production, and energy conversion.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K7_U04] predicts the properties of the materials obtained and the course of processes involving them, based on knowledge of technology and related fields and computer methods of data analysis, modelling and simulation	Is able to analyse the influence of electrode material properties on the course of electrochemical processes and to predict the efficiency of electrochemical pollutant removal, water electrolysis, and fuel cell operation.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W03] selects methods of data analysis, including statistical and modelling, useful for solving scientific and technological problems	Has advanced knowledge of electrochemical techniques used in environmental monitoring, pollutant oxidation processes, and energy conversion, and is able to interpret the results of electrochemical studies.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
LECTURE

Introduction to environmental electrochemistry. Advanced electrode materials in environmental electrochemistry

Fundamentals of electrochemical techniques. Techniques for the characterisation of electrode materials

Electrochemical detection of environmental pollutants

Advanced electrochemical oxidation processes

Methods for green hydrogen production. Water electrolysis

Electrochemical energy conversion. Fuel cells

Course content – laboratory
LABORATORY

Group work. Topics of the laboratory stations:

Electrochemical detection of environmental pollutants

Application of boron-doped diamond electrodes for the electrochemical degradation of pollutants in water by anodic oxidation

Characterisation of electrode materials

Production of green hydrogen by water electrolysis and its application in a fuel cell

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture - test	50.0%	50.0%
laboratory - assessment of short pre-lab quizzes and laboratory reports	50.0%	50.0%

Recommended reading

Basic literature	Libuś W., Libuś Z., Elektrochemia, Wydawnictwo Naukowe PWN, Warszawa, 1975.
Supplementary literature	Bard A.J., Faulkner L.R., Electrochemical Methods. Fundamentals and Applications, Wiley, 2001.
eResources addresses	

Example issues/ example questions/ tasks being completed

What are the basic electrochemical techniques used in environmental electrochemistry?

What is electrochemical anodic oxidation of pollutants in water?

What is cyclic voltammetry used for in the study of electrode materials?

What does the term green hydrogen mean?

Practical activites within the subject

Not applicable

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