GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Practical Aspects of Electrochemistry, PG_00069705		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Ryl	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	0.0	10.0	0.0	0.0	30

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	30	2.0	18.0	50

Subject objectives

The aim of the course is to familiarize students with the role of electrochemical processes in the world of science and industry, including in particular the possibilities of using electrode phenomena in practice, e.g. in electricity storage technologies, mechanisms of catalyzing chemical processes, mechanisms of electrochemical sensors operation, anti-corrosion technologies, water and wastewater treatment technologies, synthesizing thin-film systems, etc. Electrochemical measurement techniques will be presented and discussed as part of the course.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] has systematic knowledge of the physical and chemical principles of nanotechnology (methods of obtaining nanostructures, types of nanostructures, their properties, basic research methods).	The student has knowledge of electrochemical methods of obtaining and characterizing nanostructures, knows their physicochemical properties and understands the importance of nanomaterials in practical applications of electrochemistry.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_U04] can plan and conduct experiments, critically analyze their results, draw conclusions and formulate opinions. Has laboratory experience.	The student is able to plan and conduct electrochemical experiments, critically analyze the obtained results, formulate conclusions and opinions	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_W09] Has knowledge of the structure and operation of scientific instruments, measuring and test equipment and in the field of planning and conducting a physical experiment and critical analysis of its results.	The student has knowledge of the construction and operation of electrochemical equipment and measurement techniques	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Wykłady:
• Fundamentals of electrochemistry
• DC measurements
• AC measurements
• Electroanalysis, electrochemical sensors
• Electrochemical energy storage devices
• Fuel cells
• Photo and electrocatalysis
• Electrochemical water treatment
• Corrosion and protection against corrosion
Laboratories:
• Potentiometry, potentials
• Thermodynamic water stability
• Voltammetry
• Impedance spectroscopy
• Fuel cells operation
• Electroanalysis</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the structural properties of materials, solid state physics, chemistry, surface physico-chemistry. Basics in electrical engineering and physical chemistry are valuable.</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 reports</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Lecture exam</td><td>60.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>P. Atkins - Chemia Fizyczna

K. Pigoń, Z. Ruziewicz - Chemia FIzyczna

A. Czerwiński - Akumulatory, baterie, ogniwa</td></tr>
<tr><td>Supplementary literature</td><td>Publications in journals from the ISI list, presented during lectures</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>What is the role of each electrode in the measuring system?
The role of diffusion in electrochemical processes
Describe the mechanisms of selected forms of anti-corrosion protection
Why are lithium ion batteries the most widely used today, what are the alternatives?
Diversify anodic and cathodic electrochemical coating technologies</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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