



Subject card

Subject name and code	, PG_00048764						
Field of study	Green Technologies						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
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			English		
Semester of study	4	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Physical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Czub					
	Teachers	prof. dr hab. inż. Jacek Czub dr inż. Mateusz Kogut dr hab. inż. Adam Kloskowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	45.0	0.0	0.0	90
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	90	5.0		55.0		150
Subject objectives	The aim of the subject is familiarizing the students with basic concepts in electrochemistry, chemical kinetics and surface phenomena						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W02] has a basic knowledge of chemistry including general chemistry, inorganic, organic, physical, analytical, including the knowledge necessary to describe and understand the phenomena and chemical processes occurring in the environment; measurement and the determination of the parameters of these processes.	Knowledge of basic laws of physical chemistry and their applications in solving simple technological problems.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	Preparation and analysis of tables and graphs. Estimation of accuracy and precision of experimental results. Knowledge of databases in physical chemistry.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Electrolyte solution. Theory of strong electrolytes. Activity coefficients. Electrical conductivity. Electrode-solution interface. Interfacial potentials. Electrodes and galvanic cells. Thermodynamics of galvanic cells. Electromotive force measurements. Practical aspects of potentiometry. The determination of pH. Standard reduction potentials. The electrochemical series. Electrode polarization. Electrolysis. Galvanic sources of energy. Corrosion.</p> <p>Chemical kinetics. Reaction rates. Rate laws and rate constants. Elementary reactions. Reaction mechanisms. Homogeneous and heterogeneous catalysis. Enzymatic processes. Chain reactions. Explosion.</p> <p>Interfacial phenomena. Surface tension. Surfactants. Adsorption on liquid-gas interface. Gibbs adsorption isotherm. Characterization of colloidal particles. Structure of colloidal particle. Electrokinetic phenomena. Coalescence and coagulation Adsorption on solid-gas interface. Langmuir isotherm. BET isotherm. Thermodynamic description.</p>														
Prerequisites and co-requisites	Knowledge of mathematics, physics and inorganic chemistry at BSc level.														
Assessment methods and criteria	<table border="1" data-bbox="448 591 1487 757"> <thead> <tr> <th data-bbox="448 591 794 629">Subject passing criteria</th> <th data-bbox="794 591 1141 629">Passing threshold</th> <th data-bbox="1141 591 1487 629">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 629 794 689">carrying out 5 experiments and submitting the reports</td> <td data-bbox="794 629 1141 689">100.0%</td> <td data-bbox="1141 629 1487 689">25.0%</td> </tr> <tr> <td data-bbox="448 689 794 728">2 written tests in calculations</td> <td data-bbox="794 689 1141 728">50.0%</td> <td data-bbox="1141 689 1487 728">25.0%</td> </tr> <tr> <td data-bbox="448 728 794 757">written/oral exam</td> <td data-bbox="794 728 1141 757">50.0%</td> <td data-bbox="1141 728 1487 757">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	carrying out 5 experiments and submitting the reports	100.0%	25.0%	2 written tests in calculations	50.0%	25.0%	written/oral exam	50.0%	50.0%
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Example issues/ example questions/ tasks being completed	They are or will be published at the website of the Department of Physical Chemistry														
Work placement	Not applicable														