

Subject card

Subject name and code	Electroanalytical methods, PG_00081933						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Anna Wcisło				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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		5.0		40.0	75
Subject objectives	Familiarizing students with the basics of electroanalytical methods and the stages of the analytical process, developing the ability to conduct basic electrochemical analyzes and their statistical evaluation, developing the ability to independently solve problems when conducting chemical analysis						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	The student describes and classifies types of electrochemical methods and discusses their application. The student defines basic terms used in electrochemical analysis.	[SW4] test/exam - oral or written
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	The student communicates effectively in a group and uses the experiences of other people.	[SK8] observation of student's independent or team work
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	The student selects electrodes and uses them in electrochemical analysis.	[SU4] test/exam - oral or written
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student prepares the results of the analysis, including a description of the experiment, calculations, and interpretation.	[SU4] test/exam - oral or written
	[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	The student knows the health and safety rules and is able to organize the work station in accordance with them in the electroanalytical laboratory. The student is guided by the principle of saving materials and resources.	[SK4] test/exam - oral or written
	[CHEML3_U05] Uses basic statistical methods and IT techniques to describe chemical processes and analyse experimental data.	The student is able to select the appropriate computational method for the instrumental technique and research equipment used. The student interprets and critically evaluates the results of the calculations. The student is able to apply and conduct an appropriate discussion of errors.	[SU4] test/exam - oral or written
	[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	The student uses appropriate electroanalytical techniques to solve a given analysis problem. The student interprets measurement results obtained during electrochemical analysis. The student analyzes the composition of the solution based on electroanalytical techniques.	[SU4] test/exam - oral or written
	[CHEML3_W10] Enumerates and describes the basic aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences.	The student lists and defines types of electrodes. The student defines electrode processes and presents their mechanisms. The student explains the methods of measuring basic electrochemical quantities. The student describes the structure and principles of operation of electrochemical devices, such as a potentiostat, conductivity meter, laboratory power supply and galvanostat.	[SW4] test/exam - oral or written
Subject contents	1. Theoretical foundations of electroanalytical methods, types of measurement techniques. 2. Potentiometry: pH-metric electrodes, measurement principles in an aqueous environment, measuring equipment. 3. Conductometry: principles and measuring equipment, probes and measuring vessels, conductivity models, practical applications for analytical purposes. 4. Electrogravimetry: classic, internal and at controlled potential, use of electrolysis in qualitative and quantitative analysis. 5. Voltammetric and polarographic measurement techniques in chemical analysis: cyclic and linear voltammetry, coulometry. Voltammetric stripping in chemical analysis.		
Prerequisites and co-requisites	knowledge of the basics of general and analytical chemistry, ability to write equations for oxidation-reduction reactions, knowledge of work and safety rules in a chemical laboratory;		

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	100.0%
Recommended reading	Basic literature	1. Cygański Podstawy metod elektroanalitycznych, WNT, Warszawa 2. Z. Galus Elektrochemiczne metody wyznaczania stałych fizykochemicznych, PWN, Warszawa 3. W. Szczepaniak Metody instrumentalne w analizie chemicznej, PWN, Warszawa 4. J. Minczewski Chemia analityczna t. III, PWN, Warszawa	
	Supplementary literature	• Z. Galus Teoretyczne podstawy elektroanalizy chemicznej, PWN, Warszawa • A. Kisza Elektrochemia cz. I i II, WNT, Warszawa • L. Sobczyk, A. Kisza, K. Gatner, A. Koll Eksperymentalna chemia fizyczna, PWN, Warszawa • K. Kraman Zastosowania elektrod jonoselektywnych, WNT, Warszawa	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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