

**Subject card**

<b>Subject name and code</b>	Electroanalytical methods, PG_00081933						
<b>Field of study</b>	Chemistry						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>			2025/2026		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Obligatory subject group in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	2	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	4	<b>ECTS credits</b>			3.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			exam		
<b>Conducting unit</b>							
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr Anna Wcisło				
	<b>Teachers</b>		dr Anna Wcisło				
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		5.0		40.0	75
<b>Subject objectives</b>	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_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
	[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_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_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_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_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_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_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
Subject contents	<ol style="list-style-type: none"> <li>1. Theoretical foundations of electroanalytical methods, types of measurement techniques.</li> <li>2. Potentiometry: pH-metric electrodes, measurement principles in an aqueous environment, measuring equipment.</li> <li>3. Conductometry: principles and measuring equipment, probes and measuring vessels, conductivity models, practical applications for analytical purposes.</li> <li>4. Electrogravimetry: classic, internal and at controlled potential, use of electrolysis in qualitative and quantitative analysis.</li> <li>5. Voltammetric and polarographic measurement techniques in chemical analysis: cyclic and linear voltammetry, coulometry. Voltammetric stripping in chemical analysis.</li> </ol>		
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%
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	<ul style="list-style-type: none"> <li>• Z. Galus Teoretyczne podstawy elektroanalizy chemicznej, PWN, Warszawa</li> <li>• A. Kisza Elektrochemia cz. I i II, WNT, Warszawa</li> <li>• L. Sobczyk, A. Kisza, K. Gatner, A. Koll Eksperymentalna chemia fizyczna, PWN, Warszawa</li> <li>• K. Kraman Zastosowania elektrod jonoselektywnych, WNT, Warszawa</li> </ul>	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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