



Subject card

Subject name and code		Analytical Chemistry, PG_00053525						
Field of study		Biomedical Engineering						
Date of commencement of studies		October 2023	Academic year of realisation of subject			2025/2026		
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			6.0		
Learning profile		general academic profile	Assessment form			exam		
Conducting unit		Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)		Subject supervisor		dr hab. inż. Ewa Wagner-Wysiecka				
		Teachers						
Lesson types and methods of instruction		Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
		Number of study hours	30.0	15.0	30.0	0.0	0.0	75
		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	75	15.0		60.0	150	
Subject objectives		The aim of the course is to familiarize students with the issues of modern analytical chemistry and analytical problem-solving methodology.						
Learning outcomes		Course outcome		Subject outcome		Method of verification		
		[K6_U51] can conduct laboratory work connected with chemistry and biochemistry, specific to biomedical engineering		The student explains the chemical basics, describes the types of apparatus used in a given analytical method and explains the principle of its operation. Student defines an analytical problem. I plan to conduct an experiment and collect data. The student measures using selected equipment. Analyzes the obtained data and assesses the reliability of the obtained result. Justifies the use of quality assurance systems. Explains the basic issues related to the problems of environmental and process analytics. Understands the essence of the use of modern analytical methods in biomedical engineering.		[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
		[K6_W52] Knows and understands, to an advanced extent, selected aspects of chemistry and biochemistry, constituting general knowledge related to the field of study		The student has knowledge of the procedures related to the basic methods of quantitative analysis. Is able to carry out basic determinations, collect and correctly analyze the results obtained. Is able to determine the areas of application of chemical analytical methods in biomedical engineering.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	<p>Lecture: Definition and role analytical chemistry. The basic terms in analytical chemistry. The division of the analytical methods. The choice of analytical method. The elaboration of the new analytical method. Statistical methods in analytical chemistry. The types of the samples and sampling methods. Separation and preconcentration methods. Trace analysis. Methods for gases determination. Classical analysis: gravimetric and volumetric methods. Titrimetric methods: acid-base titration, complexometry, redoxymetry, precipitation titration. Spectroscopic methods of analysis: UV-Vis, IR, luminescence, emission, atomic absorption, spectroscopies, turbidimetry, nephelometry, magnetic resonance spectroscopy, mass spectrometry, X-ray spectroscopy. Thermoanalytical methods. Electroanalytical methods: potentiometry, electrogravimetry, coulometry, polarography, voltamperometry, conductometry. Chromatographic methods: gas chromatography, high performance liquid chromatography. Electrophoresis. Kinetic methods of analysis. Miniaturization in analytical chemistry. Elements of environmental analysis. Elements of process analytical chemistry. Quality assurance systems. Tutorial: Statistical analysis of data. Solutions. Units for expressing concentrations and calculating concentrations. Acid-base reactions. Buffers. Acid-base titration, titration curves, titration error. Complexometry: complex stability constants. Complexometric titration. Reactions of precipitation of solids. Precipitation titration. Redox reactions. Equilibria in redox systems. Redox titration. Gas laws. Analysis of gases. The analysis of the composed material. Evaluation of the results. Laboratory: Safety in laboratory. Calibration, standards preparation, sampling. Volumetric analysis – precipitation titration. Gravimetric analysis. UV-Vis spectroscopy. Spectrofluorimetry IR spectroscopy. High performance chromatography. Potentiometry. Optimizing in analytical chemistry.</p>														
Prerequisites and co-requisites	Matters realized during the subject "Chemistry"														
Assessment methods and criteria	<table border="1" data-bbox="448 595 1487 786"> <thead> <tr> <th data-bbox="448 595 794 633">Subject passing criteria</th> <th data-bbox="794 595 1141 633">Passing threshold</th> <th data-bbox="1141 595 1487 633">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 633 794 667">Written exam</td> <td data-bbox="794 633 1141 667">51.0%</td> <td data-bbox="1141 633 1487 667">40.0%</td> </tr> <tr> <td data-bbox="448 667 794 723">Test: material covering problems discussed during exercises</td> <td data-bbox="794 667 1141 723">51.0%</td> <td data-bbox="1141 667 1487 723">30.0%</td> </tr> <tr> <td data-bbox="448 723 794 786">Lab problems tests, correctly done exercises, reports</td> <td data-bbox="794 723 1141 786">51.0%</td> <td data-bbox="1141 723 1487 786">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	51.0%	40.0%	Test: material covering problems discussed during exercises	51.0%	30.0%	Lab problems tests, correctly done exercises, reports	51.0%	30.0%
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eResources addresses	Adresy na platformie eNauczanie:														
Example issues/ example questions/ tasks being completed															
Work placement	Not applicable														

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