

Subject card

Subject name and code	Instrumental analysis in chemistry, PG_00155914						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group 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 not applicable		
Semester of study	5		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Grzegorz Romanowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45		0.0		30.0	75
Subject objectives	To familiarize students with the principles of electroanalytical, spectroscopic and chromatographic methods and the stages of the analytical process; developing the ability to conduct basic instrumental analyzes and their statistical evaluation; developing the ability to independently solve problems when conducting chemical analysis with issues mentioned in the lecture program content.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BJORL3_W02] Understands the role of physical and chemical experimentation, mathematical theoretical models approximating reality, and computer simulations in scientific research methodology; is aware of technological, apparatus, and methodological limitations in scientific research	Explains the principles of sample preparation for analysis. Describes the structure and principles of operation of the equipment used. Understands the financial and technical conditions of the selected instrumental method.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[BJORL3_U02] Has the ability to perform measurements of basic quantities used in physics and chemistry; can develop, describe and present the results of simple experiments and computer simulations; can perform quantitative analyses and formulate qualitative conclusions on this basis; can estimate measurement uncertainties	Uses basic formulas to calculate the amount of analyte. Carry out the measurement in accordance with the instructions for the exercise. Interprets the results in qualitative and quantitative terms along with their statistical processing. Recognizes and operates the equipment used in the analytical laboratory.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[BJORL3_W01] has a general knowledge of the basic concepts and principles of nuclear physics and chemistry, understands their historical development and their importance not only for nuclear safety and radiation protection, but also for understanding the modern world; has a basic knowledge of biology and ecology	Defines the basic laws in electroanalytical, spectroscopic and chromatographic. Has the knowledge needed to solve a specific analytical problem.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[BJORL3_W05] has knowledge of the elementary components of matter and the types of fundamental interactions between them, the manifestations of these interactions in phenomena occurring at scales ranging from subatomic to subatomic, knows the time and energy scales associated with these phenomena; knows the basics of biology and ecology in understanding the biological and ecological aspects of nuclear safety and radiation protection	Knows how to critically evaluate the analysis performed and the results obtained. Has knowledge of phenomena occurring in electroanalytical methods, spectrophotometry and chromatography.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[BJORL3_W03] knows how to plan and perform a simple physical or chemical experiment and analyze the results obtained; knows the elements of the theory of measurement uncertainty as applied to experiments; knows the basic units of the SI system and its most important derived units; knows other systems of measurement units	Selects an analytical method for a specific sample. Explains and explains the principles of conducting analyzes using various techniques instrumental. Recognizes the limitations of using each method.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
Subject contents	A. Lecture topics: Stages of the analytical process, analytical measurement methods, preparation of results and their statistical evaluation, spectroscopic methods, chromatographic methods and electroanalytical methods. B. Problems of laboratory exercises: Basics of laboratory work with equipment, performing chemical determinations and analyzes related to spectroscopic methods (UV-Vis spectroscopy), chromatographic methods (gas chromatography) and electroanalytical methods (potentiometry, conductometry, coulometry, polarography, voltammetry, amperometric titration).		
Prerequisites and co-requisites	Knowledge of chemical methods of qualitative and quantitative analysis		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	20.0%
	report	51.0%	10.0%
	exam	51.0%	70.0%

Recommended reading	Basic literature	W. Szczepaniak Metody instrumentalne w analizie chemicznej, PWN, Warszawa A. Cygański Metody spektroskopowe w chemii analitycznej, WNT, Warszawa A. Cygański Podstawy metod elektroanalitycznych, WNT, Warszawa
	Supplementary literature	G.W. Ewing Metody instrumentalne w analizie chemicznej, PWN, Warszawa J. Minczewski, Z. Marczenko Chemia analityczna t. III Analiza instrumentalna, PWN, Warszawa D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch Podstawy chemii analitycznej, PWN, Warszawa J. Garaj Fizyczne i fizykochemiczne metody analizy, WNT, Warszawa
	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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