

Subject card

Subject name and code	Instrumental Analysis in Chemistry, PG_00207521						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2026		Academic year of realisation of subject			2028/2029	
Education level	Bachelor's 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	3		Language of instruction			Polish	
Semester of study	5		ECTS credits			4.0	
Learning profile	academic		Assessment form			exam	
Conducting unit	Laboratory of Chemistry and Analytics of Cosmetics -> 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		55.0	100
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_W01] Has an advanced knowledge and understanding of the main concepts and principles of nuclear physics and chemistry, understands their historical development and significance not only for nuclear safety and radiation protection, but also in the context of the fundamental dilemmas facing modern civilization.	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_W03] Has advanced knowledge and understanding of the principles of planning and conducting simple physical and chemical experiments and analyzing obtained results; has knowledge and understanding of the fundamentals of measurement uncertainty as applied to experiments, the base SI units and the most important derived units, as well as other systems of 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
	[BJORL3_W02] Has an advanced understanding of the role of physical and chemical experiments, 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_W05] Has advanced 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 how to critically evaluate the analysis performed and the results obtained results. Has knowledge of phenomena occurring in electroanalytical methods, spectrophotometry and chromatography.	[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%
	exam	51.0%	70.0%
	report	51.0%	10.0%
Recommended reading	Basic literature	W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa A. Cygański, Metody elektroanalizy, 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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