

Subject card

Subject name and code	Analytical chemistry, PG_00155898						
Field of study	Nuclear safety and radiological protection						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
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	2		Language of instruction		Polish not applicable		
Semester of study	3		ECTS credits		7.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Laboratory of Environmental Analytics and Radiochemistry -> Department of Environmental Chemistry and Radiochemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Alicja Boryło				
	Teachers		mgr Klaudia Lanczewska-Bejenka				
			dr hab. Alicja Boryło				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	30.0	45.0	0.0	0.0	90
	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	90		0.0		85.0	175
Subject objectives	to improve students' skills and familiarise them with all the issues mentioned in the curriculum content: qualitative and quantitative chemical analysis, structural chemical analysis, task solving, laboratory work						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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	1. Is able to plan an analytical project, organize and manage a team. 2. Is able to define the scope of an analytical project. 4. Is able to plan a schedule. 5. Is able to monitor the project 6. The student is able to use knowledge of analytical chemistry. 7. The student is able to use analytical methodologies 8. Is able to develop the goal of an analytical project	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task
	[BJORL3_U03] is able to use the formalism of physics and chemistry to describe phenomena in the microworld; is able to use the methodology of biology and ecology to an elementary extent when describing the effects of radiation on biological objects and in the environment	1. Has basic knowledge of analytical chemistry, methods, techniques, work planning tools and its organization. 2. Knows basic analytical techniques and analytical titration techniques. 3. Is able to discuss the most important analytical sections and briefly characterize them.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
	[BJORL3_U01] can formulate the basic laws of physics and chemistry using mathematical formalism	1. Knows basic time management techniques. 2. Has basic knowledge about project teams and communication in projects 3. Is able to discuss the most important analytical sections and briefly characterize them. 4. Is able to explain key assumptions, techniques, tools and advantages of popular analytical methodologies	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
	[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	1. Has the competence to lead a team. 2. Values teamwork 3. The student is aware of the variability of analytical techniques 4. Can justify the importance of analytical factors in decisions made	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task
	[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	1. Knows basic time management techniques. 2. Has basic knowledge about project teams and communication in projects 3. Is able to discuss the most important analytical sections and briefly characterize them. 4. Is able to explain key assumptions, techniques, tools and advantages of popular analytical methodologies	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task
	[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	1. Has basic knowledge of analytical chemistry, methods, techniques, work planning tools and its organization. 2. Knows basic analytical techniques and analytical titration techniques. 3. Is able to discuss the most important analytical sections and briefly characterize them.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task

Subject contents	• Validation of analytical methods • Chemical analysis • I group of cations • II group of cations • III group of cations • Qualitative analysis of selected anions • Manganometry • Redoximetry • Precipitation and complexometric analysis • Weight analysis		
Prerequisites and co-requisites	General and inorganic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam	51.0%	50.0%
	laboratory excersis	51.0%	25.0%
	audytorium excersises	51.0%	25.0%
Recommended reading	Basic literature	• Jerzy Minczewski, Zygmunt Marczenko, Analytical chemistry, PWN, Warsaw, 2019, volumes 1 and 2 • Jan Dobrowolski, Analytical chemistry, PZWL, Warsaw • Tadeusz Lipiec, Zdzisław Szmaj, Analytical chemistry with elements of instrumental analysis, PZWL, Warsaw • Ryszard Kocjan, Analytical chemistry, PZWL, volume 1 • Andrzej Cygański, Chemical methods of quantitative analysis, WNT, Warsaw, 2017 (only for the second part, i.e. quantitative analysis) • Douglas A. Skoog, Donald M. West, James F. Holler, Stanley R. Crouch, Fundamentals of analytical chemistry, PWN, Warsaw • Lecture notes	
	Supplementary literature	not applicable	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not applicable		
Work placement	Not applicable		

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