

Subject card

Subject name and code	Analytical chemistry, PG_00050792						
Field of study	Environmental Protection						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Alicja Boryło				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The aim of the classes is to improve skills and familiarize students with all issues mentioned in the lecture program as well as task calculation						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OŚL3_U11] Uses statistical methods as well as algorithms and IT techniques, including application software packages to describe environmental experiments and analysis of typical data in socio-economic activities based on science and natural sciences.	Based on mathematical methods, he can describe environmental experiments and use exact and natural sciences to interpret economic and social activities	[SU3] text preparation/written work [SU4] test/exam - oral or written
	[OŚL3_W13] Defines the basic principles of occupational safety, ergonomics and hygiene.	Knows the definitions of safe work, ergonomics and occupational hygiene	[SW4] test/exam - oral or written [SW3] text preparation/written work
	[OŚL3_U02] Plans, selects appropriate research and measuring equipment and devices, performs physicochemical measurements and experiments; analyses the results and draws conclusions based on them.	Based on the appropriate research equipment and experiments, the student analyzes the results and formulates conclusions	[SU3] text preparation/written work [SU4] test/exam - oral or written
	[OŚL3_K04] Demonstrates responsibility for the safety of her/his own and others' work and for the workplace, and correctly follows the rules of conduct in emergencies.	Is able to act correctly in emergency situations and is responsible for work safety	[SK3] text preparation/written work [SK4] test/exam - oral or written
	[OŚL3_U07] Uses basic laboratory techniques, conducts field research and performs qualitative and quantitative analyses and draws conclusions on this basis for practical purposes.	Based on field research and qualitative and quantitative analysis, the student is able to formulate conclusions	[SU3] text preparation/written work [SU4] test/exam - oral or written
	[OŚL3_W11] Discusses measurement systems and analysis techniques used in monitoring the state of the natural environment.	knows techniques for monitoring the state of the natural environment	[SW4] test/exam - oral or written [SW3] text preparation/written work
	[OŚL3_W03] Operates mathematical, statistical and IT methods and tools in the description and interpretation of phenomena and processes occurring in the environment.	Is able to apply mathematical methods to interpret phenomena occurring in the environment	[SW4] test/exam - oral or written [SW3] text preparation/written work

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		
	Buffers		
	Titration curves		
Prerequisites and co-requisites	General and inorganic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	100.0%
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	Hamilton L.F., Simpson S.G., Ellis D.W., Calculations in analytical chemistry, WNT, Warsaw, 1973 Wesołowski M., Głóser K., Zimna D., Collection of tasks from chemical analysis, WNT, Warsaw, 2002 Galus Z., Calculus exercises in analytical chemistry, PWN, 2019
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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