

Subject card

Subject name and code	Analytical chemistry, PG_00050793						
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		2.0		
Learning profile	academic		Assessment form		credit		
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						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	The aim of the classes is to improve skills and familiarize students with all the issues mentioned in the program content: qualitative and quantitative chemical analysis and chemical structural analysis, as well as improving laboratory work.						

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.	Knows basic methods for describing the environment	[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
	[OŚL3_W03] Operates mathematical, statistical and IT methods and tools in the description and interpretation of phenomena and processes occurring in the environment.	Knows basic mathematical methods and tools to interpret processes occurring in the environment	[SW4] test/exam - oral or written [SW3] text preparation/written work [SW5] implementation of a problem task
	[OŚL3_W11] Discusses measurement systems and analysis techniques used in monitoring the state of the natural environment.	Knows analytical techniques used in natural environment monitoring	[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
	[OŚL3_U07] Uses basic laboratory techniques, conducts field research and performs qualitative and quantitative analyses and draws conclusions on this basis for practical purposes.	Is able to apply basic laboratory techniques to perform qualitative and quantitative analyzes and formulate conclusions based on 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
	[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.	The student is aware of the variability of analytical techniques, cares about work safety and is able to take appropriate steps in emergency situations	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work [SK4] test/exam - oral or written [SK5] implementation of a problem task [SK6] demonstration of practical skills [SK8] observation of student's independent or team 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.	Knows the basic equipment and apparatus and is able to perform measurements and then formulate conclusions based on the results obtained	[SU1] oral statement/conversation/discussion [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
	[OŚL3_W13] Defines the basic principles of occupational safety, ergonomics and hygiene.	Has knowledge of the basic principles of safety in the laboratory work as well as ergonomics and occupational hygiene	[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	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	passing auditorium and laboratory exercises in general and inorganic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	75.0%
	own laboratory work	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 Szmal, 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)	
	Supplementary literature	Hamilton L.F., Simpson S.G., Ellis D.W., Calculations in analytical chemistry, WNT, Warsaw, 1973	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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