University of Gdańsk

Subject card

Subject name and code	Analytical Chemistry, PG_00204637		
Field of study	Nuclear safety and radiological protection		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
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
Semester of study	3	ECTS credits	5.0
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		

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	50.0	140

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_U01] Can formulate the 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_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
[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.	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_W01] Has a detailed 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.	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_U03] Is able to use the formalism of physics and chemistry to describe phenomena in the microworld.	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

<table>
<tr><td>Subject contents</td><td>• 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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>General and inorganic chemistry</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>audytorium excersises</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>written exam</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>laboratory excersis</td><td>51.0%</td><td>25.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>• 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)
• Douglas A. Skoog, Donald M. West, James F. Holler, Stanley R. Crouch, Fundamentals of analytical chemistry, PWN, Warsaw
• Lecture notes</td></tr>
<tr><td>Supplementary literature</td><td>not applicable</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>not applicable</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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