



Subject card

Subject name and code	Analytical chemistry, PG_00060862						
Field of study	Chemical Technology						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
Education level	first-cycle 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	4	ECTS credits			7.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Żaneta Polkowska					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	60.0	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		5.0		80.0	175
Subject objectives	Knowledge of methods to solve analytical problems, understanding theoretical basis for individual analytical techniques.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U03] Uses chemical knowledge to design compounds, perform physicochemical and analytical measurements, and obtain appropriate sources of information.	Has structured knowledge of analytical chemistry Can use basic concepts of analytical techniques Can use analytical techniques			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
	[K6_U02] Performs design calculations of technological processes, selects industrial equipment, operates laboratory equipment and conducts material analyses	Has structured knowledge of analytical chemistry Can use basic concepts of analytical techniques Can use analytical techniques			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
	[K6_W02] Possesses the chemical knowledge necessary to synthesize, analyze and evaluate the properties of compounds and processes used in chemical technology.	Has structured knowledge of analytical chemistry Can use basic concepts of analytical techniques Can use analytical techniques			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Course content – lecture SUBJECT OF ANALYTICAL CHEMISTRY: types of analytical information, criteria of method selection. Handbooks and basic journals. Work safety and organisation in an analytical laboratory. Basic steps in a typical analysis. Representative sampling and sample preparation for analysis. Propagation of independent measurement errors. GRAVIMETRIC METHODS OF ANALYSIS: factors influencing on sediments solubility and purity, Most favourable conditions for precipitation. Sources of errors and methods of avoidance. Thermogravimetry. Precipitation titration: general equation of titration curves, types and principles of activity of indicators, Argentometric and Mercurometric Methods. ACIDIMETRY AND ALKALIMETRY: general equation of titration curves and its particular solution for weak and strong acids and bases, titration in nonaqueous medium, theoretical principles of polyfunctional acids alkalimetry and acidimetry of carbonates, visual indicators of titration end point. OXIDATION/REDUCTION: types of methods, analytical reactions and factors influencing on equilibrium constants, equation of redox titration curves, molecular multiplier based on redox reactions. Electrogravimetric analysis. COMPLEXOMETRY: equation of titration curves, indicators, complexometry and analytical characteristics of selected complexones, mercurimetry, types of complexometric methods, determination of water hardness.</p>											
	<p>Course content – laboratory GRAVITATIVE ANALYSIS: Factors affecting the solubility and purity of precipitates, optimal conditions for precipitation, separation of precipitates. Sources of errors and methods for avoiding them. Thermogravimetry. Precipitation titration: general equation of precipitation titration curves, types and principles of operation of indicators, argentometry and mercurometry. ALKACIMETRY: Classification of methods, general equation of acid-base titration curves and its specific solutions for strong and weak acids and bases, titration in aqueous and non-aqueous media, theoretical foundations of polyprotic acid alkalimetry and carbonate acidimetry, visual endpoint indicators of titration. REDOXOMETRY: Classification of methods, analytical reactions and factors affecting the equilibrium of redox reactions, equations of titration curves, indicators, molecular multipliers based on redox reactions. Electrogravimetric analysis. COMPLEXOMETRICS: equation of titration curves, indicators, complexometry and analytical characterization of selected complexones, mercurimetry, types of complexometric methods, determination of water hardness.</p>											
Prerequisites and co-requisites	Student should have knowlege of the: stoichiometry, chemical reaction equilibrium, reaction and theory of acids and bases, precipitation reaction, solubility product, reaction mechanism and complex formation constant											
Assessment methods and criteria	<table border="1" data-bbox="448 824 1489 936"> <thead> <tr> <th data-bbox="448 824 794 860">Subject passing criteria</th> <th data-bbox="794 824 1141 860">Passing threshold</th> <th data-bbox="1141 824 1489 860">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 860 794 896">Lecture - exam</td> <td data-bbox="794 860 1141 896">50.0%</td> <td data-bbox="1141 860 1489 896">40.0%</td> </tr> <tr> <td data-bbox="448 896 794 936">laboratory - reports</td> <td data-bbox="794 896 1141 936">50.0%</td> <td data-bbox="1141 896 1489 936">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture - exam	50.0%	40.0%	laboratory - reports	50.0%	60.0%
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Lecture - exam	50.0%	40.0%										
laboratory - reports	50.0%	60.0%										
Recommended reading	Basic literature	<p>1. J. Minczewski, Z. Marczenko, Chemia analityczna, tom 1 i 2 wyd. 9 i 10, zm., PWN, Warszawa 2005 2. D.A. Skoog, D.M. West, J.F. Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, (VII ed.), Saunders College Publishing, Philadelphia 1996, Podstawy Chemii Analitycznej, t. 1, PWN, W-wa 2006 3. A. Cygański, Chemiczne metody analizy ilościowej, WN-T, Warszawa 1992. 4. A. Cygański, B. Ptaszyński, J. Krystek, Obliczenia w chemii analitycznej, WN-T, Warszawa 2000. 5. Z. Galus, Ćwiczenia rachunkowe z chemii analitycznej, PWN, Warszawa 2005. 6. Konieczka P., Namieśnik J., Zygmunt B., Bulska E., Świtaj-Zawadka A., Naganowska A., Kremer E., Rompa M., Ocena i kontrola jakości wyników pomiarów analitycznych, WN-T, Warszawa 2007.</p>										
	Supplementary literature	<p>1. A. Hulanicki, Reakcje kwasów i zasad w chemii analitycznej, PWN, Warszawa 1992, wyd. 3 zm. 2. D. Kealey, P.J. Haines, Krótkie wykłady. Chemia Analityczna, PWN, W-wa 2005. 3. Podstawy analityki, [red.] J. Łukasiak, Akademia Medyczna w Gdańsku, Gdańsk 1990. 4. A. Hulanicki, Współczesna chemia analityczna. Wybrane zagadnienia, PWN, Warszawa 2001 5. K. Eckschlager, Błędy w analizie chemicznej, PWN, Warszawa 1974. 6. K. Danzer, E. Than, D. Moloch, Analityka. Przegląd systematyczny, WN-T, Warszawa 1993. 7. J. Czermiński i współautorzy, Metody statystyczne dla chemików, PWN, Warszawa 1986.</p>										
	eResources addresses											
Example issues/ example questions/ tasks being completed	Setting the NaOH titer to soda, what is the basic substance? What conditions should it meet? Replace the other substances used to adjust the titer - write the reactions.											
Practical activites within the subject	Not applicable											

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