GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00037593		
Field of study	Green Technologies		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	English
Semester of study	5	ECTS credits	9.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Justyna Płotka-Wasylka	
	Teachers	dr hab. inż. Justyna Płotka-Wasylka dr inż. Natalia Jatkowska dr inż. Paweł Kubica dr inż. Tomasz Majchrzak Chintankumar Padariya prof. dr hab. inż. Piotr Konieczka prof. dr hab. inż. Andrzej Wasik dr inż. Bartłomiej Cieślik dr inż. Weronika Hewelt-Belka	

Lesson types and methods of instruction	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	25.0	110.0	225

Subject objectives	Acquiring the necessary knowledge in the field of analytical chemistry, including the basic stages of the process analytical, principles of sampling and preparation of samples for analysis and theoretical foundations selected methods of classical and instrumental analysis.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has a basic knowledge of chemistry including general chemistry, inorganic, organic, physical, analytical, including the knowledge necessary to describe and understand the phenomena and chemical processes occurring in the environment; measurement and the determination of the parameters of these processes.	After completing the course, the student will have knowledge of basic issues related to analytical chemistry.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U02] is able to operate equipment and perform typical analyzes of studies of environmental pollution, is able to carry out an analysis of typical environmental pollution and simple devices according to specification	The student is able to define problem and find his way solutions. The student learns new methods analytical, both chemistry classical analytical and instrumental and can use them to solve analytical problems. He recognizes chemical phenomena and can do them interpret and resist appropriate calculations	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	The student is able to define problem and find his way solutions	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents

Course contents: The subject of analytical chemistry. Types of analytical information, criteria for division and choice of methods. The basic stages of the analytical process. Downloading and representative preparation analytical sample. Theoretical and methodical basis of classical quantitative analysis. Weight analysis, alkacymetry, redoxometry, complexometry, precipitation titration. Theoretical and methodical the basics of instrumental methods of quantitative analysis. Electrogravimetry, elemental analysis of compounds organic, spectroscopic methods of analysis, chromatography, electroanalytical methods. Rating reliability of results. Types of errors, error propagation, uncertainty of the result, presentation of results, comparison of accuracy and precision of determinations

Prerequisites and co-requisites

Knowledge of chemical reactions and physicochemical phenomena

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final exam	60.0%	40.0%
Tests during thes semester	60.0%	10.0%
Practical exercises	60.0%	50.0%

Recommended reading

Basic literature

1. J. Minczewski, Z. Marczenko, Chemia analityczna, PWN, Warszawa 1985

2. A. Hulanicki, Reakcje kwasów i zasad w chemii analitycznej, PWN, Warszawa 1992 wyd. 3 zm.

3. B. Bobrański, Analiza ilościowa związków organicznych. PWN, Warszawa 1979.

4. K. Eckschlager, Błędy w analizie chemicznej, PWN, Warszawa 1974.

5. Z. Galus, Ćwiczenia rachunkowe z chemii analitycznej, PWN, Warszawa 1972.

6. A. Cygański, Chemiczne metody analizy ilościowej, WNT, Warszawa 1992.

7. K. Danzer, E. Than, D. Moloch, Analityka, WNT, Warszawa 1980.

8. J. Czerminski i współautorzy, Metody statystyczne dla chemików, PWN, Warszawa 1986.

	Supplementary literature	1. Podstawy analityki [red. J. Łukasiak], Akademia Medyczna w Gdańsku, Gdańsk 1990. 2. G.W. Ewing, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 1980. 3. T.H. Gouw, Nowoczesne metody instrumentalne analizy, WNT, Warszawa 1976. 4. J. Kryściak, Chemiczna analiza instrumentalna, PZWL, Warszawa 1989. 5. Metody instrumentalne w kontroli zanieczyszczeń środowiska [red. J. Namieśnik], Wyd. Pol.Gdańskiej, Gdańsk 1992 6. H.W. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, Instrumental Methods of Analysis, Wadsworth,. Belmont 1981. 7. Fizykochemiczne metody kontroli zanieczyszczeń środowiska, [red] J. Namieśnik i Z. Jamrógiewicz, WN-T, Warszawa 1998. 8. M. Jarosz, E. Malinowska, Pracownia chemiczna analizy instrumentalnej, Wydawn. Szkolne i Pedagogiczne, Warszawa 1994 9. D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, Podstawy chemii analitycznej, PWN, Warszawa 2006
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Gravimetric analysis: Factors affecting the solubility and purity of sediments, optimal conditions for sediment precipitation, separation of sediments. Sources of errors and methods to avoid them. Precipitation from homogeneous solutions. Characteristics and scope of applications of weighing methods. Alkacymetry: Division of methods. General equations of alkaline titration curves, case of strong acid titration.Titration in non-aqueous environments. Visual endpoint indicators. Redoxometry: Division of methods, analytical reactions, titration curve equations, indicators, the influence of various factors on the course of the reaction. Titration: Titration curve equations. Adsorption point indicators. Complexometry: Equations of titration curves. Indicators. Complexes and complexonometry.	
Work placement	Not applicable	