University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Chemical analysis of complex samples, PG_00139935		
Field of study	Chemical Business		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group
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	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Department of Environmental Analysis -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Łukasz Haliński	
	Teachers	dr hab. Łukasz Haliński dr hab. Magda Caban	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	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	40.0	75

Subject objectives

1. To familiarize students with the nature and diversity of biological samples;
2. To familiarize students with methods of extraction of organic compounds and planning of extraction;
3. To familiarize students with methods of purifying extracts prior to instrumental analysis;
4. To familiarize students with screening methods and confirmation methods;
5. To introduce students to the possibilities and limitations of analytical techniques;
6. To develop the ability to design an analytical process based on the nature of the samples;
7. To introduce students to the method validation and determining method reliability.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BCHMU2_W05] Knows and understands the main trends in the development of chemistry combined with economics as two interpenetrating scientific disciplines.	Plans analytical procedures as part of an industrial process.	[SW4] test/exam - oral or written
[BCHMU2_U01] Is able to, on the basis of her/his knowledge, propose a solution to problems in chemistry, taking into account the economic aspect by using advanced measurement techniques.	Plans analytical procedures based on the nature of the matrix and test compounds, taking into account the cost of the developed procedure and proposing to reduce it.	[SU4] test/exam - oral or written
[BCHMU2_U02] Is able to define her/his interests, develop them within the chosen direction and in connection with the subject of her/his master's thesis by implementing the process of self-education and planning her/his professional career.	Evaluates the advantages and disadvantages of analytical techniques in the practical planning of an analytical procedure and is able to independently select the appropriate analytical approach to solve a problem.	[SU4] test/exam - oral or written
[BCHMU2_W01] Knows and understands complex physicochemical processes and is able to analyse their course in connection with other fields of science.	Presents and describes methods for limiting the effects of matrix components on assay results and the capabilities and limitations of basic analytical techniques.	[SW4] test/exam - oral or written
[BCHMU2_K04] Is willing to properly assess the acquired knowledge, respect and disseminate it in order to solve specific cognitive and practical issues.	Critically evaluates the data in the literature and the analytical results obtained.	[SK4] test/exam - oral or written

Subject contents

Characteristics of complex samples - biological samples, environmental samples, food samples. Characteristic groups of undesirable components (interferents). Removal of undesirable components: dialysis and chromatography of exclusion, liquid-liquid extraction, solid-phase extraction, liquid chromatography. Purification and fractionation of extracts. Practical aspects of analysis by chromatographic and spectroscopic techniques. Effects of undesirable components on analytical results: selectivity and specificity of methods, effects related to contamination of apparatus, matrix effects. Screening and confirmatory analytical methods. Issues related to qualitative and quantitative analysis. Targeted, untargeted and group analysis. Basics of validation of analytical methods for complex samples. Certified reference materials. A critical look at selected analytical methods and practical aspects of analytical process planning.

Prerequisites and co-requisites

Completed courses: organic chemistry, analytical chemistry.

Knowledge of the basics of general, inorganic, organic and analytical chemistry including: structure and physicochemical properties of basic groups of organic and inorganic compounds, knowledge of chemical nomenclature, calculation of solution concentrations.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam (120 min)	51.0%	100.0%

Recommended reading

Basic literature	Szczepaniak W. Metody instrumentalne w analizie chemicznej. PWN, Warszawa, 2005 Witkiewicz Z. Podstawy chromatografii, WNT, Warszawa, 2005. Namieśnik J., Jamrógiewicz Z., Pilarczyk M., Torres L. Przygotowanie próbek środowiskowych do analiz. WNT, Warszawa, 2000. Namieśnik J., Łukasiak J., Jamrógiewicz Z. Pobieranie próbek środowiskowych do analiz. PWN, Warszawa, 1995. Smyth W.F. Analytical chemistry of complex matrices. Wiley & Teubner, Chichester, UK, 1996. Scientific papers dealing with the topic of the lecture.
Supplementary literature	Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG, Gdańsk, 2010
eResources addresses	

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.