



Subject card

Subject name and code	INSTRUMENTAL ANALYSIS, PG_00064463						
Field of study	Chemistry						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
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. Piotr Konieczka					
	Teachers	prof. dr hab. inż. Piotr Konieczka					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
	eNauczenie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=4981 Moodle ID: 4981 ANALIZA INSTRUMENTALNA https://enauczanie.pg.edu.pl/2025/course/view.php?id=4981						
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		2.0		18.0	50
Subject objectives	The analytical process, instrumental analytical methods (primary and absolute methods, indirect methods); theoretical basis and description of selected instrumental analytical techniques (spectroscopic techniques; chromatographic techniques and related, hyphenated techniques).						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U07] is able to undertake accurate and precise analytical measurements, to synthesise simple and large-molecular chemical compounds, to purify and analyse their composition and to determine their structure using classical and instrumental methods	The student is able to perform accurate and precise analytical measurements, select appropriate methods for the synthesis of chemical compounds and for the purification and analysis of their composition. The student is able to determine the structure of chemical compounds using classical and instrumental methods and interpret the obtained measurement results.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K6_U04] creates detailed documentation of the results obtained from the experiments carried out individually or as part of a team, analysing and interpreting the results in the form of text documents, spreadsheets, graphs, technological diagrams, multimedia presentations using correct chemical nomenclature	The student is able to create detailed documentation of the results of experiments carried out independently or in a team, analyze and interpret data, present it in the form of text documents, spreadsheets, charts, technological diagrams, and multimedia presentations, using correct chemical nomenclature.	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task
	[K6_W02] classifies acquired information, assessing its usefulness in solving the posed problems concerning the synthesis and analysis of selected groups of compounds, determining their physical and chemical properties, making measurements and determining the parameters of chemical reactions and processes	The student knows the methods of classifying and evaluating the usefulness of information obtained from literature, databases, and other scientific sources in the context of solving problems related to the synthesis and analysis of selected groups of chemical compounds. The student knows the principles of determining the physical and chemical properties of compounds, performing analytical measurements, and determining the parameters of chemical reactions and processes using classical and instrumental methods.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	[K6_K03] is aware of the importance of caring for the quality and diligence of the tasks performed, being responsible for their consequences	The student is aware of the need to take responsibility for the consequences of their actions, including in independent and team work, while observing the principles of safety and professional ethics.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
Subject contents	<p>Course content – lecture Chromatographic techniques:</p> <ul style="list-style-type: none"> -quantitative analysis in GC -chromatographic detectors - the principle of operation and the area of use - liquid chromatography -mass spectrometry in chromatography <p>Hyphenated techniques -use in analytics</p> <p>Extraction techniques as a step of sample preparation</p> <hr/> <p>Course content – laboratory preparation of standard solutions calibration using flame photometry basics of gas chromatography - selection of chromatographic separation conditions application of TLC - interpretation of the obtained results measurement of the content of selected metal ions using atomic absorption spectroscopy compilation of measurement results, their interpretation, and conclusions</p>		
Prerequisites and co-requisites	Basic knowledge of analytical chemistry on the theory of instrumental methods of analysis.		

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	participation in the lectures	60.0%	50.0%
	test	60.0%	50.0%
Recommended reading	Basic literature	1. A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa, 2002. 2. Z. Witkiewicz, J. Hepter, Chromatografia gazowa, WNT, Warszawa, 2009. 3. W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 2008.	
	Supplementary literature	1. K. Kuklińska, A. Melnyk, B. Zabiegała, Spektrometr mas jako detektor chromatograficzny, połączenie GC-MS, Wydawnictwo PG, Gdańsk 2014	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What elements does a typical CV-AAS camera consist of? 2. List the advantages of the CV-AAS technique. 3. Please provide definitions of BTV. Explain how this parameter can be used in the description of the sorption strength of a solid sorbent? 4. Define the parameters characterizing the sorption media used to sample gas-phase analytes. 5. Describe the phenomenon of discrimination. How does it affect the quality of the obtained results of chromatographic determinations. 6. What is the mass spectrum? 7. List and characterize the parameters for quantifying the extraction process. 8. Characterize the aspects determining the selection of the right extraction technique. 9. List the advantages of voltammetric methods. <ol style="list-style-type: none"> 10. What are the main groups of calibration techniques and what are their characteristics? 11. What determines the choice of calibration method? 12. What type of calibration technique is IDMS? 13. What are the main limitations of using IDMS? Specify the conditions for using this technique. 14. Give the basic advantages of the IDMS technique 15. Define: speciation, speciation analytics, combined techniques. 16. What are the characteristics of combined techniques. Present the advantages and disadvantages. 17. What determines the choice of the combined technique used? 		
Practical activities within the subject	Not applicable		

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