



Subject card

Subject name and code	Instrumental Analysis, PG_00053082						
Field of study	Chemistry						
Date of commencement of studies	October 2021	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	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						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Piotr Konieczka					
	Teachers	prof. dr hab. inż. Piotr Konieczka dr hab. inż. Mariusz Marć dr inż. Małgorzata Rutkowska dr hab. inż. Weronika Hewelt-Belka prof. dr hab. inż. Bożena Zabiegała dr inż. Bartłomiej Cieślak					
Lesson types and methods of instruction	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						
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_U08] is capable to design and carry out the experiment which is necessary to confirm a given hypothesis and sees wider context, often beyond-technical, of the analysed phenomena	can design and conduct an experiment			[SU4] Assessment of ability to use methods and tools		
	K6_W03	has basic knowledge of theoretical chemistry			[SW3] Assessment of knowledge contained in written work and projects		
	K6_U07	can make accurate and precise measurement in the analytical laboratory			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		

Subject contents	<p>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>											
Prerequisites and co-requisites	Basic knowledge of analytical chemistry on the theory of instrumental methods of analysis.											
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 34%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>test</td> <td>60.0%</td> <td>50.0%</td> </tr> <tr> <td>participation in the lectures</td> <td>0.0%</td> <td>50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	test	60.0%	50.0%	participation in the lectures	0.0%	50.0%
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Recommended reading	Basic literature	<p>1. A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa, 2002.</p> <p>2. Z. Witkiewicz, J. Hepter, Chromatografia gazowa, WNT, Warszawa, 2009.</p> <p>3. W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 2008.</p>										
	Supplementary literature	1. K. Kuklińska, A. Melnyk, B. Zabiegała, Spektrometr mas jako detektor chromatograficzny, połączenie GC-MS, Wydawnictwo PG, Gdańsk 2014										
	eResources addresses	Adresy na platformie eNauczenie:										

<p>Example issues/ example questions/ tasks being completed</p>	<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. 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?
<p>Work placement</p>	<p>Not applicable</p>

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