

Subject card

Subject name and code	Instrumental methods in cosmetic analysis, PG_00183752						
Field of study	Metody instrumentalne w analizie kosmetyków (Ćw. laboratoryjne)						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study 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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		1.0		
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. Monika Paszkiewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	20.0	0.0	0.0	20
	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	20		1.0		4.0	25
Subject objectives	- To introduce students to the basic analytical techniques used in the analysis of cosmetics, with particular emphasis on their structure and principles of operation - To provide knowledge on cosmetics quality control methods, covering both the theoretical basis of instrumental techniques and their practical application to the qualitative and quantitative analysis of chemical ingredients, active substances, impurities and auxiliary ingredients. - To develop competence in the field of analysing results, interpreting measurement data and formulating conclusions in the context of the requirements of the cosmetics industry. - To prepare students to independently apply instrumental techniques in cosmetics analysis.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_W07] Selects experimental and theoretical techniques to the extent necessary to understand the description and modelling of medium complexity chemical processes.	1. Is able to operate research equipment independently 2. Is able to optimise the operating parameters of measuring equipment based on experimental data 3. Is able to select appropriate methods and instrumental techniques for the identification and determination of selected compounds in cosmetics	[SW4] test/egzamin - ustny lub pisemny [SW2] prezentacja/projekt/referat/raport
	[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	1. Is able to develop, present and interpret the results of experimental research 2. Critically interprets the results of chemical experiments and theoretical calculations 3. Identifies and discusses errors affecting the reliability of experimental data	[SU2] prezentacja/projekt/referat/raport [SU4] test/egzamin - ustny lub pisemny
	[CHEMMU2_U05] Presents the results of research in the form of an independently written paper containing a description and justification of the purpose of the work, adopted methodology, results and their significance in comparison to other similar research.	1. Drafts a written report documenting the course and results of experimental research 2. Presents and interprets research results, justifying the adopted methodology and conclusions in the context of literature data	[SU2] prezentacja/projekt/referat/raport
	[CHEMMU2_K02] Is able to undertake a variety of roles in the team, including supervisory ones.	1. Works effectively in a team, taking on various roles, including managerial ones 2. Demonstrates responsibility for the results of the team's work 3. Is responsible for their own and others' safety at work: knows how to act in emergency situations, exercises caution when handling chemicals, and exercises caution when handling measuring equipment	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[CHEMMU2_W10] Uses knowledge of the principles of operation of the basic scientific and research apparatus used in chemistry.	1. Knows and understands the theoretical basis of the chromatographic process 2. Knows the structure and principle of operation of research equipment used for chromatographic separations 3. Knows the possibilities of using instrumental techniques in the quantitative and qualitative analysis of chemical components, active substances, impurities and auxiliary components used in cosmetics 4. Is able to select appropriate instrumental methods for the identification and determination of selected compounds in cosmetics	[SW4] test/egzamin - ustny lub pisemny
Subject contents	Classification of methods used in the cosmetics industry to assess the quality of raw materials, active ingredients and finished products. Collection and preparation of cosmetic samples for analysis. UV-Vis spectroscopy apparatus design (radiation source, monochromator, cuvette, detector) and its application in cosmetics analysis. Instrumental analysis methods, including gas chromatography: theoretical principles, apparatus design, column characteristics, selected detectors, qualitative and quantitative analysis. High-performance liquid chromatography (HPLC): theoretical basics, apparatus design, column characteristics, selected detectors, qualitative and quantitative analysis. Mechanisms of chromatographic processes, selectivity and efficiency of chromatographic systems. Combined techniques: gas chromatography coupled with mass spectrometry (GC-MS), liquid chromatography coupled with mass spectrometry (LC-MS). Practical application of instrumental and combined techniques in cosmetics analysis. Quality of analytical data validation, accuracy and precision, reproducibility, limit of detection (LOD) and limit of quantification (LOQ), specificity, selectivity, linearity, measurement range.		
Prerequisites and co-requisites	General chemistry, organic chemistry, inorganic chemistry, analytical chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Reports	51.0%	30.0%
	Partial tests covering all material laboratory exercises	51.0%	70.0%

Recommended reading	Basic literature	- Gościańska A., Olejnik A., Nowak A., <i>Analytics of cosmetic products</i>, Cursiva Publishing Offices, Kostrzyn, 2012 - Szczepaniak W., <i>Instrumental methods in chemical analysis</i>, PWN, Warsaw, 2010 - Collective work edited by Zieliński W. and Rajca A., <i>Spectroscopic Methods and Their Application to the Identification of Organic Compounds</i>, Scientific and Technical Publishing Offices, Warsaw, 2000 - Witkiewicz Z., <i>Fundamentals of Chromatography</i>, Scientific and Technical Publishing Offices, Warsaw, 2005
	Supplementary literature	Collective work edited by Stanisław B. and Muszalska A., <i>Methods for testing the quality of raw materials and cosmetic products</i> , Scientific Publishing Offices of the Karol Marcinkowski, Medical University in Poznań, 2009
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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