

Subject card

Subject name and code	Advanced formulations of cosmetic products with elements of quality control, PG_00183754						
Field of study	Zaawansowane formułacje preparatów kosmetycznych z elementami kontroli jakości (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		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Laboratory of Chemistry and Analytics of Cosmetics -> Department of Analytical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Elżbieta Adamska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		4.0		16.0	50
Subject objectives	The aim of the course is to develop skills in preparing, formulating, and evaluating advanced cosmetic products with consideration of quality control methods.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_K02] Is able to undertake a variety of roles in the team, including supervisory ones.	The student can work effectively in a laboratory team, taking on various roles and responsibilities, including leadership, to achieve a common research goal.	[SK5] realizacja zadania problemowego [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[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.	The student is able to prepare and present research results concerning cosmetic formulations in a written report, including the aim, methodology, results, analysis, and discussion in the context of relevant literature.	[SU2] prezentacja/projekt/referat/raport
	[CHEMMU2_W10] Uses knowledge of the principles of operation of the basic scientific and research apparatus used in chemistry.	The student knows the operating principles and application of instruments used in cosmetic product analysis and quality control (e.g. mechanical stirrer, viscometer).	[SW1] wypowiedź ustna/rozmowa/dyskusja [SW5] realizacja zadania problemowego
	[CHEMMU2_U01] Plans and implements chemical experiments of medium complexity.	The student is able to independently plan and conduct laboratory experiments related to the development and evaluation of cosmetic formulations.	[SU5] realizacja zadania problemowego
	[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	The student is able to analyze and interpret experimental results of cosmetic formulations and identify potential sources of measurement errors.	[SU1] wypowiedź ustna/rozmowa/dyskusja
	[CHEMMU2_W12] Knows the principles of occupational health and safety to the extent that allows independent work on a research and/or measurement position.	The student knows and applies health and safety regulations in the chemical laboratory, particularly when handling cosmetic substances and analytical instruments.	[SW4] test/egzamin - ustny lub pisemny
	[CHEMMU2_K03] Understands the need for systematic work on various projects of a long-term nature and knows how to set priorities for the implementation of undertaken tasks.	The student can plan and consistently carry out multi-stage laboratory tasks related to the development and evaluation of cosmetic products.	[SK5] realizacja zadania problemowego
Subject contents	1. Characteristics of advanced cosmetic systems- emulsions, gels, suspensions, multiphase formulations. 2. Selection and role of cosmetic raw materials depending on product type and function. 3. Designing composition and manufacturing technology of cosmetic formulations. 4. Laboratory documentation and sample preparation for analysis. 5. Methods for assessing the stability and quality of cosmetic formulations (viscosity, pH, physical stability, durability). 6. Quality control of cosmetic products- standards and technical documentation requirements. 7. Practical use of analytical and measuring instruments applied in cosmetic product analysis (stirrers, viscometers, pH meters, spectrophotometers). 8. Data analysis and interpretation: preparation of reports and discussion of results in the context of scientific literature. 9. Safety rules and good laboratory practice in cosmetic formulation research.		
Prerequisites and co-requisites	Students will have acquired knowledge of organic chemistry, physical chemistry, basic cosmetics technology, and chemical analysis during their undergraduate studies. Students should also be able to use basic laboratory equipment, understand occupational health and safety regulations in a chemical laboratory, and be able to analyze measurement results.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Student's activity and independence during laboratory classes	60.0%	10.0%
	Research report	60.0%	20.0%
	Laboratory project	60.0%	30.0%
	Problem-based test	60.0%	40.0%

Recommended reading	Basic literature	1. <i>Sionkowska, Chemia kosmetyczna. Wybrane zagadnienia, Wydawnictwo Naukowe UMK, Toruń 2019</i> 2. <i>Molski, Chemia Piękna, Wydawnictwo Naukowe PWN, Tom 1 i 2, Warszawa 2021</i> 3. <i>Uzdrowska, Recepturowanie kosmetyków i proces ich wdrożenia, Wydawnictwo Naukowe PWN, Warszawa 2024</i>
	Supplementary literature	1. <i>Marzec, Chemia kosmetyków, Dom Organizatora TNOiK, Toruń, 2009</i> 2. <i>Sarbak, Chemia w kosmetyce i kosmetologii, MedPharm, Wrocław 2013</i> 3. <i>Jabłońska-Trypuć, Czerpak, Surowce kosmetyczne i ich składniki, MedPharm, Wrocław 2008</i>
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Development of a cosmetic serum formulation with targeted activity (e.g., antioxidant, anti-aging, or sebum-regulating) using advanced active ingredients. 2. Design and preparation of a multi-phase emulsion (e.g., W/O/W) with an evaluation of the effect of emulsifier and stabilizer type on formulation stability. 3. Application of nanocarriers and microcapsules in advanced cosmetic formulations. 4. Formulation of a hydrogel with controlled release of active substances. 5. Validation of analytical methods used for cosmetic product quality control (e.g., pH, viscosity, stability). 6. Analysis of process parameters (temperature, mixing speed, homogenization time) on physicochemical properties of the final product. 7. Preparation of a comprehensive research report and oral presentation discussing results in the context of scientific literature.	
Work placement	Not applicable	

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