

Subject card

Subject name and code	Application of biomolecules in cosmetics, PG_00082057						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject			2028/2029	
Education level	Bachelor'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	3		Language of instruction			Polish	
Semester of study	5		ECTS credits			1.0	
Learning profile	academic		Assessment form			credit	
Conducting unit	Laboratory of Medical Chemistry -> Department of Biomedical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Julia Witkowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	To acquaint students: with the structure of the skin with the functions of lipids, amino acids, peptides, proteins, sugars and their derivatives (hyaluronic acid) in human skin, with existing cosmetic products containing amino acids, peptides, proteins, sugars, lipids and other small-molecule biomolecules of natural origin, with the structure and function of structural proteins (collagen, elastin, keratin) of the human body and the structure and function of peptides and proteins used in cosmetics (signaling and transport peptides, neuropeptides, silk, casein, aosain, albumin, etc.).						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.		The student demonstrates independence in developing issues in the field by using available literature and scientific articles.			[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written [SK5] implementation of a problem task	
	[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.		The student uses the acquired theoretical knowledge.			[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion	
	[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.		The student has knowledge about the function and structure of amino acids, peptides and proteins used in cosmetic chemistry.			[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion	

Subject contents	Amino acids used in cosmetics as factors stimulating the repair processes of human skin and hair. Structure, division and role of peptides in the human body and their use in cosmetics: relaxing peptides, transporting peptides, stimulating peptides, "smart" peptides, peptide antibiotics. The use of chemical modifications in cosmetic peptides. Structure and biological properties of proteins that are the building blocks of skin, hair and nails, as well as proteins used in cosmetics: collagen, elastin, keratin, silk, casein, aosain, albumin. Structure and biological and physicochemical properties of simple and complex sugars used in cosmetics. The special role of hyaluronic acid in cosmetics. Structure, functions and occurrence. Lipids of natural origin used in cosmetics. Structure and biological functions.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test exam with open questions	51.0%	100.0%
Recommended reading	Basic literature	Xian Jun Loh, Polymers for Personal Care Products and Cosmetics (Polymer Chemistry Series), Volume 20, Royal Society of Chemistry G. Baki and Gabriella. Baki, <i>Introduction to cosmetic formulation and technology</i> . John Wiley and Sons Ltd, 2022. Accessed: Jun. 13, 2024 L. Dai and I. Hansenne-Cervantes, Protein-Based Materials in Cosmetics, <i>Handbook of the Extracellular Matrix</i> , pp. 123, 2023, doi: 10.1007/978-3-030-92090-6_18-1. G. Secchi, Role of protein in cosmetics, <i>Clin Dermatol</i> , vol. 26, no. 4, pp. 321325, 2008, doi: 10.1016/J.CLINDERMATOL.2008.04.004.	
	Supplementary literature	M. Molski, <i>Chemia Piękna Tom 1</i> . Warszawa: Wydawnictwo Naukowe PWN, 2021. Accessed: Jun. 13, 2024 A. Marzec, <i>Chemia nowoczesnych kosmetyków - Substancje aktywne w preparatach i zabiegach kosmetycznych - Marzec</i> , I. Dom Organizatora TNOiK, 2010.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Skin structure. Skin aging processes. Structural proteins of the skin. Amino acids and peptides used in cosmetic chemistry. Smart peptides. Protein hydrolysates.		
Work placement	Not applicable		

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