



Subject card

Subject name and code	Raw materials for the cosmetics industry, PG_00060782						
Field of study	Chemical Technology						
Date of commencement of studies	October 2023		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	3		Language of instruction		Polish -		
Semester of study	6		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Biotechnology and Microbiology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Adam Macierzanka				
	Teachers						
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						
	eNauczanie source addresses: Moodle ID: 2893 Surowce przemysłu kosmetycznego https://enauczanie.pg.edu.pl/2025/course/view.php?id=2893						
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 aim of the course is to provide a theoretical and practical presentation of the criteria for selection, as well as the methods of sourcing and processing cosmetic raw materials, with particular emphasis on raw materials from the groups of substances most important to the cosmetic industry.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W08] has knowledge of raw materials and products in cosmetics, fat chemistry and technology, knows the technology of obtaining cosmetic products and methods of assessing their properties	The student knows and can identify the physicochemical properties of lipids; is able to select and use the equipment and methodologies necessary for the processing and analysis of lipid substances.	[SW1] Assessment of factual knowledge
	[K6_U06] is able to select the chemical and technological concept of the production method, is able to justify the suitability of the raw materials used, analyses and evaluates the quality of the products obtained, critically analyses the functioning of existing technical solutions and evaluates these solutions	The student is able to select an appropriate technological concept and to search scientific databases for information confirming the effectiveness or lack of effectiveness of cosmetic ingredients.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W05] has knowledge of chemical technology based on mineral or energy resources and modern energy sources, understands the concept of sustainable development, knows the principles of green chemistry and environmentally friendly process engineering, has knowledge of occupational safety in the chemical industry	The student is able to assess and anticipate the impact of social and institutional requirements on the development of cosmetic product manufacturing technologies.	[SW1] Assessment of factual knowledge
	[K6_K02] understands the non-technical aspects and implications of the activities of a chemical engineer, including the impact on the environment, is aware of professional behaviour, observance of professional ethics and respect for diversity of views and cultures	The student is aware of the environmental impact of the cosmetic manufacturing process at every stage of the product's life cycle.	[SK5] Assessment of ability to solve problems that arise in practice

1. Fat-derived raw materials, including:

- Simple and complex lipids of natural origin (mainly plant-based) their role in forming the structure and stabilising cosmetic products (e.g. tri- and monoacylglycerols, waxes, phospholipids, ceramides).
- Selected groups of secondary lipids and their use in the cosmetics industry (e.g. paraffinic hydrocarbons, fatty acids and fatty alcohols, sterols, tocopherols).
- Sourcing of simple, complex and secondary lipids for cosmetic applications.
- Chemical reactions and physical transformations of fats relevant to the processing of cosmetic lipid raw materials, e.g. fat hydrolysis (splitting), esterification, etc.
- Industrial production of fatty acids and their derivatives. Methods for the fractionation of fatty acids.
- Production of alkaline and metallic soaps.
- Mechanisms of formation and methods of preventing adverse changes in lipid substances, e.g. lipid oxidation (causes, mechanisms, pro- and antioxidants, etc.).

2. Surface-active agents (surfactants), including:

- Discussion of the structure and functions of ionic and non-ionic surfactants.
- Use of surfactants in specific cosmetic applications, e.g. emulsifiers for O/W and W/O emulsions, solubilisers, foaming agents, viscosity regulators, etc.
- The hydrophiliclipophilic balance (HLB) of surfactants and the use of HLB values in the industrial selection of surfactants for cosmetic products.
- The role of surfactants in reducing surface and interfacial tension; technological and performance-related consequences.

3. Biologically active substances of natural origin, including:

- Vitamins, antioxidants, etc.
- Extracts and preparations (aqueous, oil-based including essential oils, etc.).

4. Other groups of raw materials, including:

- Hydrophilic/hygroscopic substances (humectants).
- Preservatives and the most commonly used preservative systems.

Course content – laboratory

1. Fat-derived raw materials

Laboratory classes will cover practical issues related to the sourcing, processing, analysis and application of fat-derived raw materials in cosmetic products, including natural lipids, their transformations and methods for preventing their undesirable changes.

2. Surface-active agents (surfactants)

Laboratory classes will focus on investigating the properties, selection and application of ionic and non-ionic surfactants in cosmetic formulations, with particular emphasis on emulsification processes, foaming behaviour and the application of the HLB concept.

	3. Biologically active substances of natural origin Laboratory classes will concentrate on the sourcing, evaluation of properties and practical application of biologically active natural substances, such as vitamins, antioxidants and plant extracts, in cosmetic products. 4. Other groups of raw materials Laboratory classes will address the characterisation and practical use of selected groups of cosmetic raw materials, including hydrophilic substances (humectants) and preservatives, as well as commonly used preservative systems in cosmetic formulations.		
Prerequisites and co-requisites	A general knowledge of the fundamentals of organic, analytical and physical chemistry, as well as chemical technology and biotechnology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory exercises	100.0%	40.0%
	Written examination	50.0%	60.0%
Recommended reading	Basic literature	1. Physical Properties of Lipids, ed. A. G. Marangoni, S.S. Narine, Marcel Dekker, Inc., New York, 2002. 2. Barel A., Paye M., Maibach H., Handbook of Cosmetic Science and Technology, wyd. III, Londyn, Informa Health Care, 2009. 3. F. Gunstone, F. Padley, Lipid Technologies and Applications, Marcel Dekker Inc., New York, 1997. 4. E. Board, Hand Book Of Oils, Fats And Derivatives With Refining And Packaging Technology, Engineers India Research Institute, 2009. Current review articles in scientific journals.	
	Supplementary literature	Meryem Uckaya, Fatih Uckaya, Nazan Demir, Yasar Demir; Evaluation of the efficiency and safety in cosmetic products, International Journal of Pharmaceutics 499 (2016) 295300. Huang, Catherine K, and Timothy A Miller. The truth about over-the-counter topical anti-aging products: a comprehensive review. Aesthetic surgery journal vol. 27,4 (2007): 402-12 And other scientific publications on cosmetic ingredients.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Which ingredients are most commonly used to formulate the lipid phase of a cosmetic emulsion? How should stabilisers be selected for a given type and intended use of an emulsion?		
Practical activities within the subject	Not applicable		

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