GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Bio-impacts of Cosmetic Ingredients, PG_00068905		
Field of study	Cosmetic technologies		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	3.0
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. Błażej Kudłak	
	Teachers	dr hab. inż. Błażej Kudłak dr inż. Monika Pawłowska dr inż. Natalia Maciejewska dr inż. Karolina Matejczuk	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	40.0	0.0	10.0	60

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 2190 Biooddziaływania składników kosmetyków
https://enauczanie.pg.edu.pl/2025/course/view.php?id=2190

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	60	5.0	10.0	75

Subject objectives

The aim of course is to present to Students the knowledge on basiccosmetics ingredients (including active ones) and learning biological and mathematical methods enambling evaluation of possible interactions that may occur between selected substances intentionally or non-intentionally present in cosmetics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] explains the structure and functions of cosmetic raw materials and methods and instruments for determining their quantity, quality and activity	Student is able to enumerate cosmetics ingredients and give their functions and know main methods of quantitaing and qualitating them as well as of their activity	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_W01] defines the phenomena, processes and physicochemical laws used to produce utility goods and provide services	Student know phenomena, processes and [hysicochemical laws used to manufacture goods and conduct services	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	Course content – lecture
	Main topics covered during the lectures include:
	
	1. Basic biological concepts:
	
	1. Skin structure and functions
	2. Tissue types and functions
	3. Cell structure and cell types
	
	2. Molecular processes occurring in the skin:
	
	1. Mechanisms of transport through the skin
	2. Skin immune system
	3. Cellular receptors and enzymes
	
	3. Factors determining bioavailability and toxicity of compounds:
	
	1. Fundamentals of toxicology the concept of dose
	2. Physicochemical properties and structure of compounds
	3. Biological, genetic, and environmental factors
	
	3. Factors determining bioavailability and toxicity of compounds [20.10.2025]:
	
	1. Fundamentals of toxicology the concept of dose
	2. Physicochemical properties and structure of compounds
	3. Biological, genetic, and environmental factors
	
	4. Transport of compounds in the body (ADME):
	Absorption, distribution, accumulation, and excretion of compounds, reactions with biomolecules
	
	5. Cosmetic ingredients and their biological interactions
	
	6. Biological and molecular tests determining the bioavailability and safety of cosmetic ingredients
	
	7. Endocrine-active compounds
	
	8. Mathematical foundations of modeling interactions and biointeractions
	(including models of concentration addition/independent actions)
	
	Course content – laboratory
	
	Conditions for Receiving a Positive Grade in Laboratory Classes:
	
	1. Completion of laboratory exercises
	
	• Perform 9 laboratory exercises according to the schedule.
	
	2. Entry tests
	
	• Positive grades are required from tests covering each exercise (ex. 210).
	• Only insufficient grades (2.0) may be corrected, once, at a date agreed with the instructor, after the given class has taken place.
	
	3. Reports
	
	• A report for each exercise (ex. 210) is mandatory (at the subgroup level).
	• The document must include the first and last names of all subgroup members; the same grade will be assigned to each listed person.
	• Submission via eLearning in PDF format within 7 days after the class.
	• Delays:
	  • Up to 1 day late grade reduced by 0.5
	  • Up to 2 days late grade 3.0
	• Only reports graded 2.0 may be corrected, once, within 7 days of the announcement of grades.
	
	4. Attendance
	
	• One justified absence is permitted.
	• In the case of one justified absence, there is no obligation to take/pass the entry test for that exercise.
	
	5. Organizational requirements
	
	• For each class, a laboratory coat and instructions are mandatory (minimum 1 copy per subgroup).

	• Students without a laboratory coat may not participate in classes and will receive a grade of 2.0 for the entry test. **6. Final grade** • The arithmetic mean of all entry tests and reports. Course content – seminar Part I Prepared and Presented by Students: **Biointeractions of Cosmetic Ingredients:** 1. Skin microbiome and cosmetic ingredients how do cosmetics affect the microbiological balance of the skin? 2. Anti-wrinkle ingredients in cosmetics 3. Emollients in cosmetics what are they and how do they care for the skin? 4. Ingredients of cosmetics intended for children what should be considered? What poses a risk? 5. Ingredients used in hair care cosmetics their action and impact on hair condition 6. Ingredients of makeup removers how do they work and why are they important? 7. Disorders of the skins hydrolipid barrier the role of ceramides and their protective effects 8. Antiperspirants, e.g., aluminum salts how do they work and are they safe? 9. UV filters in cosmetics types, mechanisms, and potential toxicity 10. Azelaic acid and other compounds used in acne treatment 11. Vitamins in cosmetics different forms and their effects on the skin 12. Hyaluronic acids in cosmetology types and application forms 13. Biointeractions of retinol use, absorption, and side effects in cosmetics 14. SLS and other detergents in cosmetics their role and impact on the skin 15. Parabens as preservatives in cosmetics safety and controversies 16. Glycerin in cosmetics properties and use as a moisturizing ingredient 17. Preservatives in cosmetics why are they necessary and what types exist? 18. Ingredients affecting the absorption of cosmetic compounds how do they act on the skin? 19. History of cosmetics ingredients used in the past and their toxicity Part II Calculations by Students with Instructor Participation: 1. Based on data obtained during laboratory classes, parameters will be calculated to assess possible **synergy, antagonism, or additivity** using **IA (Independent Action) and CA (Concentration Addition) models**.
Prerequisites and co-requisites	- basic knowledge within area of biology, chemistry, mathematics, soft skills in presenting
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
positive finishing of seminar part (according to requirements)	60.0%	30.0%
written exam	60.0%	40.0%
positive finishing of laboratory part (according to requirements)	60.0%	30.0%

Recommended reading		
	Basic literature	attached in the eNauczanie
	Supplementary literature	attached in the eNauczanie
	eResources addresses	
Example issues/ example questions/ tasks being completed	n.d.	
Practical activites within the subject	Not applicable	

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