GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	BIOTECHNOLOGY AND LIPID TECHNOLOGY, PG_00065642		
Field of study	Biotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Chemistry Technology and Biotechnology of Food -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Dorota Martysiak-Żurowska	
	Teachers	dr hab. inż. Dorota Martysiak-Żurowska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	15.0	60

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 1359 BIOTECHNOLOGIA I TECHNOLOGIA LIPIDÓW
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1359

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	10.0	55.0	125

Subject objectives

The aim of the course is to familiarize students with lipid biotechnology and technologies used in production processes of industrial importance in the food, fuel, pharmaceutical, and medical industries, as well as with the directions and possibilities of their development.
The course also aims to organize knowledge of biotechnological and technological techniques used in the fat industry, to develop skills in analyzing unit processes applied in the extraction, modification, and refining of fats, and to determine the purposes and methods of obtaining lipids and their derivatives through biotechnology for use in the food, cosmetics, pharmaceutical, medical, and technical industries.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U05] proposes solutions to technological and scientific problems in biotechnology and related fields using experimental methods and bioinformatics, statistics and specialized databases	The student is able to analyze and solve problems related to the optimization of lipid biotechnological processes using experimental methods, statistical tools, and specialized databases, as well as to interpret the obtained results in the context of practical applications.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K7_U03] designs technological solutions for obtaining useful goods using biomolecules and living organisms based on the state of the art in accordance with the latest scientific literature	The student is able to interpret a technological process for the production and modification of lipids (e.g., fatty acids, phospholipids, bioactive lipids) using microorganisms and lipolytic enzymes, based on current scientific literature and biotechnology trends.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K7_W07] has the skills to design experiments with respect to the protection of intellectual property and the principles of bioethics and applicable legislation	The student is able to assess a research experiment on lipid modification and analysis, taking into account biosafety principles, research ethics, and intellectual property protection in the context of applying the results in industrial and scientific practice.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K7_K03] understands the social role and importance of providing reliable information and opinions to the public	The student can explain the importance of lipid biotechnology in the context of public health, food, pharmaceutical, and environmental industries in a manner understandable to non-specialists, ensuring accuracy and credibility of the message.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills

Subject contents

Lecture:
1. Scopes of biotechnological activities used in obtaining, purifying, processing and modifying lipids.
2. Biotechnology in the edible fat industry.
3. Biotechnology in the production of biofuels.
4. Biotechnology in the production of detergent ingredients and lipid derivatives for the cosmetics industry.
5. Biotechnological use of lipids for pharmaceutical purposes. Liposome technology in basic research and clinical
pharmacology.
6. Commercialized lipid-based products (including glycerol) produced biotechnologically
7. Technologies for extracting, purifying and modifying food fats.
Lab: Biotechnological processes of fat modification (esterification) and analysis of the impact of these processes on the physicochemical properties of fats. The use of biotechnological methods for the degradation of waste animal and plant fats.
Seminar: Student presentations based on the most current articles in the field presented in the course.

Prerequisites and co-requisites

Knowledge of the basics of food chemistry and food analysis.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Seminar: presentation of own work, discussion of the topic	60.0%	20.0%
Laboratory: Reports presenting the implementation of laboratory tasks	60.0%	30.0%
Lecture: exam	60.0%	50.0%

Recommended reading

Basic literature

- Lipid Biotechnology Ed. Tsung Min k., Gardner H.
- Technologia Tłuszczów Jadalnych. Niewiadomski H. WNT, Warszawa,
- Biotechnologia żywności . WNT, pod red. W. Bednarski, A. Repsa
- Surowce Tłuszczowe. Niewiadomski H. WNT, Warszawa,

	Supplementary literature	Current scientific articles on the issues of the subject, e.g. Journal of American Oil Chemists Society, Eur. J. Lipid Sci. Technol., INFORM (ed. AOCS).
	eResources addresses	
Example issues/ example questions/ tasks being completed	Chemical and enzymatic interesterification of edible fats. Obtaining cocoa butter substitutes by fractional crystallization method. Microbial bioconversion of fat waste.	
Work placement	Not applicable	

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