GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Chemistry and Technology of Fats, PG_00048563		
Field of study	Chemical Technology		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Colloid and Lipid Science -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Adam Macierzanka	
	Teachers	dr hab. inż. Adam Macierzanka dr inż. Ilona Kłosowska-Chomiczewska	

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	0.0	45
	E-learning hours included: 0.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=3013						

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	45	2.0	78.0	125

Subject objectives	The aim of the class is to gain fundamental knowledge of the chemistry and technology of fats/lipids. As part of the course, the students gain knowledge about the structure and properties of lipids and their natural occurrence and the ways of acquiring them for industrial purposes. Students learn about the technological processes and chemical and physicals restructuring the fats/lipids can undergo. The students also learn about the methods of lipid modification as well as the fundamental analysis of lipid substances.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U09	Student is familiar with analitical methods used in industrial laboratories for assessing properties of fats. Student is able to make measurements of basic quality indicators of fats. Student is able to use the acquired knowledge to plan an experiment on extracting lipids from the raw material and compare the results obtained with literature data. The student is prepared to perform lipid analyzes and knows what errors should be avoided during their performance.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
K6_W08	The student knows the methods used to classify fats/lipids, can distinguish them on the basis of their structure. The student knows the role of lipids in various industries. The student has mastered the knowledge about the occurrence of fats and their physicochemical properties. The student understands the essence of chemical reactions that lipids undergo spontaneously and modifications used in industry to achieve lipid-based products with desired properties.	[SW1] Assessment of factual knowledge

Subject contents

- Lipids; structure, composition and properties.
- Fatty acids main structural features, properties and sources.
- Acylglycerols and other simple lipids. Phospholipids; characteristics and applications. Sphingolipids.
- Sterols and waxes.Tocopherols and lipid-soluble vitamins.
- Chemical processes in fats and fatty acid usage.
- Hydrolysis of fats and fatty acids production.
- Esterification and interesterification.
- Fractionation of fatty acids.
- Fatty acids derivatives.
- Production of soaps.
- Hydrogenation of oils; reaction mechanism, catalysts and selectivity.
- Oxidation of lipids, autoxidation and antioxidants.
- Polymerization, epoxydation and others chemical reactions of fats and fatty acids.

Prerequisites and co-requisites

Basic knowledge of organic chemistry and selected analytical methods.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	100.0%	40.0%
Written exam	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. Casimir C. Akoh, ed., Food Lipids: Chemistry, Nutrition, and Biotechnology, Fourth Edition, CRC Press, 2017. 3. B. Drozdowski, Lipidy, w: Chemiczne i funkcjonalne właściwości składników żywności, WNT, Warszawa,1994. 4. F. Gunstone, F. Padley, Lipid Technologies and Applications, Marcel Dekker Inc., New York, 1997. 5. E. Board, Hand Book Of Oils, Fats And Derivatives With Refining And Packaging Technology, Engineers India Research Institute, 2009.
Supplementary literature	1. Food Emulsifiers and Their Applications, ed. G.L.Hasenhuettl, R.W. Hartel, Chapman&hall, New York, 1997
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

1. Determination of physical and chemical properties of fats obtained under industrial conditions. Obtaining of oils/fats from a selected fat raw material and comparing the properties of the obtained oil/fat with commercially available ones.
2. Study of changes occurring in fats as a result of thermal treatment. The use of accelerated tests to study the degree of lipid oxidation. Determination of the period of induction of thermo-oxidation.
3. Analysis of basic and toilet soaps.
4. Preparation of fatty acid methyl esters - reaction kinetics study and analysis of obtained products.

Work placement

Not applicable