GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety and quality of sustainable food , PG_00057800		
Field of study	Green Technologies		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	English
Semester of study	5	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry Technology and Biotechnology of Food -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Paweł Filipkowski	
	Teachers	dr inż. Paweł Filipkowski dr hab. inż. Błażej Kudłak dr inż. Szymon Mania dr hab. inż. Dorota Martysiak-Żurowska dr Karol Parchem dr inż. Antoni Taraszkiewicz dr hab. inż. Edyta Malinowska dr hab. inż. Hanna Staroszczyk dr hab. inż. Robert Tylingo dr inż. Agata Sommer dr inż. Izabela Koss-Mikołajczyk prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska dr hab. inż. Barbara Kusznierewicz Piotr Krawczyk mgr inż. Marika Mróz Szymon Litewski	

Lesson types

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

E-learning hours included: 0.0

eNauczanie source addresses:
Moodle ID: 9086 26/27Safety and quality of sustainble food(GT)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=9086

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	60.0	125

Subject objectives	To familiarize students with modern, eco-friendly technologies for food production, processing, and preservation, within the context of "zero waste" policies and the circular economy. The objective is to develop the skills required to assess the toxicological, mutagenic, and ecotoxicological safety of sustainable food products and packaging, as well as to master advanced analytical techniques—including molecular methods such as PCR and enzymatic assays—used for detecting food adulteration, identifying pesticide residues, and evaluating the stability of food products.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	They are familiar with the principles of bioremediation in agriculture, alternative sources of proteins and fats, and the impact of modern, green food preservation technologies and "zero-waste" policies on the environment and consumer safety.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	They are capable of independently conducting analyses of food composition and adulteration using PCR techniques, isolating pigments, and determining antioxidant activity, pesticide residues, and the rheological stability of food products.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools
[K6_K05] is ready to initiate actions for public interest, preparation of social projects (economic, civil, political).	Demonstrates a readiness to implement and promote eco-friendly solutions in food technology (such as clean-label products and meat substitutes), with a commitment to public well-being and the health safety of society.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice
[K6_W05] has an elementary knowledge of the fundamental concepts and problems of quality management, the general principles of creation and development of forms of individual entrepreneurship, application of the principles of work organization and integrated management, basic principles of quality control and analysis results; knowledge of basic legal aspects relating to the management of chemicals with particular emphasis on compounds polluting the environment and business, knows and understands the basic concepts and principles of the protection of industrial property and copyright and the need for management of intellectual property.	Defines mutagenic and genotoxic risks in food, understands issues related to the ecotoxicity of packaging, and is familiar with national and global legal frameworks for the integrated management of food and feed safety (the "Omnibus" approach).	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Food Quality and Safety – an introduction to quality management systems.
Analysis of food composition and detection of food adulteration using molecular PCR techniques
Ecotoxicity of food packaging components and their degradation products.
Sustainable production of edible lipids, and the recovery of protein preparations and bioactive peptides.
Mutagenic and genotoxic risks: definitions, biological impact; sustainable versus conventional food.
Methods for detecting mutagens and genotoxins in food products.
Animal-based versus plant-based protein production: quality and safety of meat alternatives.
The "Omnibus" holistic approach to food and feed safety: regulatory simplification or deregulation?
Enhancing food security: high-yield crops, enzymatic replacement of chemical processes, "zero waste" policies, and "clean-label" foods.
Green technologies in food processing: use of biopolymers and valorization of by-products from the food industry.
Biological bioremediation in sustainable agriculture and its significance for food safety.
Plant-based foods within a sustainable food system.
Sustainable food preservation technologies: impact on safety, quality, and shelf life.

Course content – laboratory

Food Quality and Safety – an introduction to quality management systems.
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Ecotoxicity of food packaging components and their degradation products.
Sustainable production of edible lipids, and the recovery of protein preparations and bioactive peptides.
Mutagenic and genotoxic risks: definitions, biological impact; sustainable versus conventional food.
Methods for detecting mutagens and genotoxins in food products.
Animal-based versus plant-based protein production: quality and safety of meat alternatives.
The "Omnibus" holistic approach to food and feed safety: regulatory simplification or deregulation?
Enhancing food security: high-yield crops, enzymatic replacement of chemical processes, "zero waste" policies, and "clean-label" foods.
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Prerequisites and co-requisites

Basic knowledge of general chemistry, organic chemistry, and biology/biochemistry.

Ability to work safely in a chemical/biotechnological laboratory (familiarity with health and safety regulations).

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Presence	90.0%	0.0%
Weekly live or on-line quizzes/esej and/or mini-presentations during the lecture	60.0%	40.0%
Live test during laboratory sessions	60.0%	40.0%
Lab reports (after 2 weeks max)	50.0%	20.0%
possibility of being questioned during class	0.0%	0.0%

Recommended reading

Basic literature	1. Sikorski Z.E., Staroszczyk H.: *Food Chemistry*, Wydawnictwo Naukowe PWN, Warszawa, 2017. 2. Gawęcki J. (red.): *Żywność, żywienie a zdrowie*, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, 2021. 3. Bhat R.: *Sustainable Food Production Include Environmental Considerations*, Springer, 2023.
Supplementary literature	1. Rozporządzenia Parlamentu Europejskiego i Rady (WE) w sprawie bezpieczeństwa żywności i pasz (aktualne akty prawne UE). 2. Czasopisma naukowe: *Trends in Food Science & Technology*, *Food Chemistry*
eResources addresses	Supplementary http://europa.eu - • Europejski Urząd ds. Bezpieczeństwa Żywności (EFSA): https://europa.eu • System Wczesnego Ostrzegania o Niebezpiecznej Żywności i Paszach (RASFF):

Example issues/ example questions/ tasks being completed

1. Discuss the differences in the genotoxic risk profile between food produced via conventional methods and food produced using sustainable methods.
2. Design a valorization process for a selected food industry by-product, incorporating "zero waste" principles.
3. What does the PCR technique entail, and which matrices can it be used to analyze in the context of detecting food adulteration? (Task based on a laboratory experiment performed).
4. Describe the impact of the migration of components from modern biodegradable packaging on the quality and ecotoxicity of the final product.

Practical activites within the subject

Not applicable

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