GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	TECHNOLOGY OF FOOD PRESERVATION, PG_00065563		
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	3.0
Learning profile	general academic profile	Assessment form	assessment
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. Edyta Malinowska-Pańczyk	
	Teachers	dr hab. inż. Edyta Malinowska-Pańczyk	

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

eNauczanie source addresses:

Moodle ID: 713 TECHNOLOGIA UTRWALANIA ŻYWNOŚCI
https://enauczanie.pg.edu.pl/2025/course/view.php?id=713

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	5.0	40.0	90

Subject objectives

The aim of the course is to introduce students to the theoretical foundations and practical methods of food preservation, with particular emphasis on the physical, chemical, and biological mechanisms underlying these processes. Students will explore both traditional and modern preservation techniques (such as heat treatment, refrigeration, freezing, drying, high-pressure processing, irradiation, and the use of food additives) and examine their effects on microbiological safety, nutritional value, sensory quality, and product shelf life.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U101] is able to formulate complex research problems and adopts appropriate methods, obtaining innovative solutions, cooperating with other people, both as a leader and a team member	The student is able to identify and formulate complex research problems concerning the effectiveness of various food preservation methods (e.g., heat treatment, refrigeration, freezing, drying, high-pressure processing, irradiation) and select appropriate experimental and analytical methods to address them. The student applies bioinformatics tools, statistical approaches, and specialized databases to develop innovative technological solutions aimed at improving the quality and safety of food products. The student is capable of effective collaboration within an interdisciplinary team, both as a leader and as a team member.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	The student is able to identify, at an advanced level, the key physical, chemical, and biological phenomena occurring in food preservation processes, and is familiar with the theories and models that describe them. The student knows and can select appropriate analytical and design methods to assess the quality, shelf life, and safety of food products.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[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 food preservation processes and propose their optimization using experimental methods (e.g., microbiological, chemical, and sensory quality assessment), as well as statistical and bioinformatics tools and specialized databases, in order to ensure the safety and high quality of food products.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment

Subject contents

LECTURE: Shelf life of refrigerated food. Refrigeration in the meat, fish, poultry, dairy, and fruit and vegetable industries. Methods of cooling and refrigerated transport. Food preservation under freezing conditions. Changes in food caused by freezing and thawing. Methods of freezing. Storage of food in modified atmosphere and its effect on the selection of microflora. Sterilization and pasteurization. Heat resistance of microorganisms. Calculation of heat treatment conditions. Biochemical changes induced by thermal processing. Sterilizers, pasteurizers, and other equipment used in the canning industry; aseptic production of canned foods. Canning packaging, materials, and protective coatings. Quality control and microbiological stability of canned products. Food irradiation and its effects on food components and sensory properties. Potential applications of lethal effects of light pulses, ultraviolet radiation, and pulsed electric fields. Effects of ultrasound. Application of high pressure in food preservation: process conditions, equipment, and packaging. Smoking methods, composition and generation of smoke. Factors influencing adsorption and diffusion of smoke components in products. Transformations induced by smoke components. Antimicrobial and antioxidant effects of smoke constituents. Methods of reducing the content of physiologically undesirable substances formed during smoking. Design of smokehouses and smoke generators. Liquid smoke preparations. Shelf life and quality control of smoked products. Effect of pH changes on microbial growth and survival. Fermentation and acidification in the meat, fish, dairy, and fruit and vegetable industries. Preservative effects of organic acids. Effect of water activity changes on microorganisms: salting and drying. Production of lyophilized foods. Preservatives and antioxidants used in food. Potential applications of bacteriocins and natural preservatives and antioxidants. LABORATORY: Effect of pasteurization on milk shelf life. Biological methods of food preservation. Effect of salting and curing on the properties of meat products. Designing sterilization conditions. Traditional drying and freeze-drying of products. Fish smoking. Quality control of canned food packaging.

Prerequisites and co-requisites

Basic knowledge in area of microbiology and food processing

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	60.0%	40.0%
Lecture	60.0%	60.0%

Recommended reading	Basic literature	Pijanowski E., Dłużewski M., Dłużewska A., Jarczyk A.: Ogólna Technologia Żywności, WNT, Warszawa, 1996. Zeuthen P., Bogh-Sorensen L.: Food Preservation Techniques. CRC Press, Washington, DC, 2000. Ziemba Z.: Podstawy Cieplnego Utrwalania Żywności. wyd. II, WNT, Warszawa, 1993.
	Supplementary literature	Sikorski Z.E. (red. naukowy) Chemia Żywności, WNT, Warszawa, 2000. Kłyszejko Stefanowicz L.: Ćwiczenia z Biochemii. PWN, Warszawa, 1999. Szlegel H.G.: Mikrobiologia Ogólna. PWN, Warszawa, 1996.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Thermal method of food preservation. Non-conventional method of food preservation.	
Work placement	Not applicable	

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