GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technology of Food Preservation, PG_00058671		
Field of study	Biotechnology		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Edyta Malinowska-Pańczyk	
	Teachers	dr hab. inż. Edyta Malinowska-Pańczyk dr inż. Paweł Filipkowski Patryk Lichocki dr inż. Agata Sommer	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	45.0	0.0	15.0	90
	E-learning hours included: 0.0						

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	90	15.0	45.0	150

Subject objectives	The aim of the lecture is familiarizing of students with methods of food preservation.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training	The student develops and presents issues showing progress in knowledge regarding food preservation.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
	[K7_U10] is able to use knowledge about possibilities, aims and limitations of biotechnology to develop, design and obtain products and biotechnological processes in the area of his/her specialization	The student is able to design the technological process of product production, taking into account the preservation method that will limit the loss of its nutritional and biological value.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K7_U05] is able to apply instrumental methods of quantitative and qualitative analysis and studies on activity of biomolecules, select and apply diagnostic and analytical methods in the field of his/her specialty with particular emphasis on genetic, molecular and microbiological diagnostics and diagnostics based on antigen-antibody reaction	The student measures parameters affecting the effectiveness of fixation of certain products.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K7_W10] has knowledge in the field of bioprocess technology and engineering and knowledge in the field of engineering design of technical objects and processes including engineering graphics with the use of computer-aided design and databases	The student is able to calculate the parameters necessary to design the food preservation process.	[SW2] Assessment of knowledge contained in presentation
	[K7_W07] knows issues related to plant and animal raw materials, their quality, impact on human health, processing technology and chemical and biological hazards resulting from process treatment and storage	The student describes methods of food preservation. Selects a maintenance method appropriate for a specific product. Analyzes factors affecting the microbiological safety of food. Estimates changes in product properties due to conservation.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents

LECTURE. Factors affecting shelf-life of chilled foods. Refrigeration in the meat, fish, dairy and vegetable-fruit industry. Chilling equipment and refrigerated transport. Preservation at sub-zero temperatures. Changes of food properties during freezing, Methods of food freezing. Modified atmosphere packaging and its effect on microflora selection. Sterilization and pasteurization. Heat resistance of microorganisms. Biochemical changes in canned foods. Equipment and methods of sterilization and pasteurization: retort procedures and aseptic canning. High temperature-short time processes. Hermetic packaging of canned food: Containers production, used materials and protective coatings. Microbiological safety and quality control of canned food. Food irradiation: process and radiation sources. Influence of radiation on components and sensory properties of food. Regulatory and safety issues. Applications of high-intensity light and pulsed electric fields, mechanisms of microbial inactivation. Ultrasound as a preservation technology. High pressure in food preservation: principles and technologies. Effect of high pressure on microorganisms and enzymes. Various methods of smoking, generation and composition of wood smoke. The factors influencing adsorption and diffusion of smoke components. Interactions of smoke with different food components. Antimicrobial and antioxidant activity of smoke constituents. Development of sensory properties of smoked goods. Health hazard associated with smoking. Smokehouses and smoke generators, liquid smoke applications. Shelf-life and quality control of smoked food. Effect of pH on the growth and survival of foodborne microorganisms. The use of lactic-acid fermentation or organic acids addition to preserve dairy, meat, fish and vegetable products. The antibacterial efficacy of organic acids. Influence of water activity on microbial growth, death and survival. Preservation of food products by salting, curing and dehydration. Freeze-dried products. Chemical preservation. The use of natural antimicrobials from animal and plant sources. Suitability of bacteriocins and antimicrobial enzymes for food preservation. LABORATORY. Influence of pasteurization on milk shelf-life. Visitation of cold storage plant. Influence of salting and curing on properties of meat products. Drying and lyophilization of food. Production of smoked fish. SEMINAR. Presentation of a new achievements in area of food preservation.

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
Seminar - presentation of chosen topic	60.0%	20.0%
Labaratory - laboratory practise	60.0%	30.0%
Lecture- written exam	60.0%	50.0%

Recommended reading	Basic literature	**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	**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	Adresy na platformie eNauczanie: Technologia utrwalania żywności 2023/2024 - Moodle ID: 33668 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33668
Example issues/ example questions/ tasks being completed	Thermal method of food preservation. Non-conventional method of food preservation.	
Work placement	Not applicable	