Załacznik nr 1

Course name:
Food Biotechnology (Elective X)

ECTS	2
Course status	*optional, facultativ*
Course final assessment /evaluation of outcomes	*Exam*
Prerequisite	

Main field of study*:*
Dietetics

Educational profile	General academic
Code of studies and education level	***SI***
Semester of studies	summer
Language of instruction	English

Course offered by:

Name of faculty offering the course	Faculty of Food Technology
Name of department offering the course	Department of Biotechnology and General Technology of Food
Course coordinator	Anna Starzyńska-Janiszewska, Robert Duliński

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands			
FB_W1	physiological, metabolic and molecular mechanisms of production and overproduction of organic acids, amino acids, proteins, enzymes, carbohydrates and other compounds; techniques for the production of biologically active substances for industrial use.	TŻ1_W01 TŻ1_W02	
FB_W2	molecular biology (genetic engineering) techniques and their areas of application in food science and food technology; the risks and hopes for man and the environment associated with the use of genetic manipulation.	TŻ1_W01 TŻ1_W02	
FB_W3	the role of microorganisms in carrying out bioprocesses; types of microorganisms; techniques for culturing microbial cells, plant, and animal tissue cultures.	TŻ1_W01 TŻ1_W02	
SKILLS – student is able to			
FB_U1	identify and analyse factors affecting the efficiency of nucleic acid isolation from food	TŻ1_U01	
FB_U2	plan the analytical procedure for the determination of the pectinolytic activity of preparations used in food processing.	TŻ1_U04	

FB_U3	select the best method and matrix for enzyme immobilisation	TŻ1_U07	
	SOCIAL COMPETENCIES – student is ready to:		
FB_K1	work individually and as part of a team, make decisions, plan and organise work and manage time efficiently.	TŻ1_K02	
FB_K2	demonstrate responsibility for their own work and that of others in terms of safety.	TŻ1_K02	

Teaching contents

Lectures	15 hours
Topics	Definition and classification of biotechnology. Food biotechnology as an interdisciplinary field of science. Development of food biotechnology over the years. Methods of genetic modification of organisms. Somatic hybridization by protoplast fusion. Induced mutagenesis - random and targeted (gene editing - techniques and perspectives). Transgenesis - methods and tools. Transgenic micro-organisms, plants and animals in food production. Examples of applications of the above in food biotechnology. Enzymatic modifications of food ingredients. Plant, animal, and microbial enzymes important for the food industry (e.g. recombinant chymosin). Immobilisation of enzymes and multi-enzyme systems - methods, advantages and limitations. Applications of immobilisation in food biotechnology and food industry (glucose isomerase, aspartase). Biosensors Selected bioprocesses in the food industry. Production of amino acids, organic acids, vitamins, biopreservatives, postbiotics by biosynthesis methods. Single cell oils. Microbial exopolysaccharides. Microbial protein. Products of extremophiles - enzymes, cryoprotectants. Introduction to in vitro plant and animal tissue culture techniques. Isolation and purification of proteins on an industrial scale. Conditions for biosynthesis processes involving microbial cells, plant, and animal cells. Solid-state and submerged fermentation systems. STR and PBR bioreactors. Biomass separation and disintegration equipment. Membrane and chromatographic techniques. Electrochemical methods and biological affinity.
Accomplished learning outcomes	*FB_W1, FB_W2, FB_W3, FB_K1, FB_K2*
Means of verification, rules and criteria of assessment	*Written examination; a pass mark requires at least 51% correct answers to the questions asked. Contribution to the final course grade - 50%*

Classes:	15 hours
Topics	Isolation, purification and detection of genomic DNA in food Immobilization of the enzyme by gel entrapment Determination of pectinesterase activity and amylolytic activity in preparations for industrial use
Accomplished learning outcomes	*FB_U1, FB_U2, FB_U3, FB_K1, FB_K2*
Means of verification, rules and criteria of assessment	*Written test; a pass mark requires at least 51% correct answers to the questions asked. Contribution to the final course grade - 50%*

References:

Basic	*Basic Biotechnology, Ratledge C & Kristiansen B. (Eds.) Cambridge University Press, 2006* *Food Biotechnology, Shetty K., Paliyath G., Pometto A., Lavin R.E. (Eds.) Taylor & Francis Inc 2005*

Supplementary	Dysin, A. P., Egorov, A. R., Godzishevskaya, A. A., Kirichuk, A. A., Tskhovrebov, A. G., & Kritchenkov, A. S. (2023). Biologically Active Supplements Affecting Producer Microorganisms in Food Biotechnology: A Review. *Molecules*, *28*(3), 1413. https://doi.org/10.3390/molecules28031413

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	2	ECTS **
Area of academic study: T – technological sciences		ECTS**

Structure of student activity

Contact hours		32	hrs.	1.3	ECTS**
Including:	lectures	15	hrs.		
	classes and seminars	15	hrs.		
	consultations	1	hrs.		
	participation in research	0	hrs.		
	obligatory traineeships	0	hrs.		
	participation in examination	1	hrs.		
e-learning		0	hrs.	0	ECTS**
student own work		18	hrs.	0.7	ECTS**

*Areas of academic study in the fields of: H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport and health sciences; R – Agricultural, forestry and veterinary sciences; A – the arts
** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes