GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Enzymatic Preparations Technology, PG_00058292		
Field of study	Biotechnology		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Izabela Sinkiewicz	
	Teachers	dr inż. Izabela Sinkiewicz dr inż. Paweł Filipkowski	

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

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	25.0	75

Subject objectives

The aim of the lecture is to familiarize students with the currently available enzymes, present factors influencing the efficiency of enzymes, the ways of enzyme isolation and purification from biological material and the methods of immobilization and application of immobilized enzymes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 studies the activity of enzyme preparations used in industry. He analyzes the factors affecting effeciency of these enzymes.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K7_W08] has a profound knowledge of methods of obtaining biotechnological products, possibilities and limitations related to the design of biotechnological processes, understands the specificity of the biotechnological industry, both in terms of organization, management and economic analysis	Student describes methods of obtaining enzymes. He chooses the right way to isolate them. He characterizes enzyme preparations in terms of their use in obtaining a specific biotechnological product.	[SW1] Assessment of factual knowledge
[K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules	The student describes the industrial applications of enzymes. He chooses the type of preparation for a particular process in the food industry.	[SW1] Assessment of factual knowledge

Subject contents	LECTURE. Properties of enzymes from different sources. Enzyme preparations used for food production. Principles of enzyme selection. Suitability of animal organs, plants and microorganism as enzyme sources. Advantageous consequences of microbiological methods of enzyme production. Preparation of enzymes from microorganisms: Influence of media composition and conditions, and time of microorganism cultivation on enzyme yield. Induction of enzyme synthesis. Selection and improvement of microorganism strains used as enzyme sources. Cultivations on liquid and solid media. Industrial methods of isolation and preliminary purification of enzymes: Methods of cell disruption. Extraction and preliminary purification of proteins by salting out, organic solvent fractionation and thermal precipitation. Chromatographic methods of enzyme purification. Recombinant enzymes and characteristic methods of their isolation and purification. Production and application of enzymes from animal and plant materials. Processes with immobilized cells and enzymes: Methods of immobilization and kinds of the supports. Changes of enzyme properties caused by immobilization. Examples of processes carried in membrane reactors. Applications of immobilized enzymes in industry and chemical analysis. Further improvement of enzymatic technologies: Application of enzymes which are active in enhanced or low temperatures. Development of membrane techniques and multienzyme systems. Application of genetic engineering in enzyme technology. LABORATORY. Isolation and making measurements of recombinant enzyme activity. Influence of reaction conditions on enzyme activity. Use of amylolytic preparations for the production of starch syrups. Use of proteolytic preparations for the production of protein hydrolysates.
Prerequisites and co-requisites	Knowledge from the course of Biotechnology and Enzymology. Knowledge in area of enzyme structure and mechanism of enzyme catalysed reaction.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory - laboratory practise	60.0%	50.0%
Lecture - written assessment	60.0%	50.0%

Recommended reading	Basic literature	Praca zbiorowa pod redakcją J. Synowieckiego (2007): Technologia preparatów enzymatycznych pochodzenia mikrobiologicznego. Wyd. PG, Gdańsk. Whitehurst R.J., Van Oort M. (2016): Enzymy w technologii spożywczej. Wyd. PWN, Warszawa. Kołakowski E., Bednarski W., Bielecki S. (2005): Enzymatyczna modyfikacja składników żywności. WAR, Szczecin. Ratledge C., Kristiansen B. (2011): Podstawy biotechnologii. PWN, Warszawa
	Supplementary literature	Porta R., Di Pierro P., Mariniello L. Recent Research Developments in Food Biochemistry. Enzymes as Additives or processing aids. Research Signpost, 2008. Bednarski W., Reps A. Biotechnologia żywności. WNT, Warszawa, 2001.
	eResources addresses	Adresy na platformie eNauczanie: Technologia preparatów enzymatycznych 2024/2025 - Moodle ID: 41277 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41277
Example issues/ example questions/ tasks being completed	Advantages and disadvantages of enzyme technology. Applications of proteolytic enzymes. Methods of enzyme immobilization.	
Work placement	Not applicable	

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