GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design Biotechnological Processes, PG_00058618		
Field of study	Biotechnology		
Date of commencement of studies	October 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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry, Technology and Biotechnology of Food -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Tylingo	
	Teachers	dr hab. inż. Robert Tylingo dr inż. Szymon Mania mgr inż. Adrianna Banach-Kopeć	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	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	8.0	22.0	75

Subject objectives	Gaining knowledge and skills in the preparation of assumptions necessary to design the course of the biotechnological process and implementation of the project according to the created guidelines.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	The student has knowledge in the selection of processes and unit operations as well as the selection of equipment that meets the requirements specific to biotechnology	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[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 select appropriate biomolecules and biologically active compounds for a given technological process based on the knowledge of their chemical structure.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[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 updates knowledge and skills in planning and implementing assumptions for a process project in the field of biotechnology	[SW3] Assessment of knowledge contained in written work and projects
[K7_K03] is conscious and able to explain the importance of the development of science and technology for the economy	The student is able to apply bioethical regulations and the principles of intellectual property protection when planning the course of a biotechnological process.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
[K7_U07] is able to consider bioethical issues and regulations in research planning and design of biotechnological products and processes	The student is able to plan and implement an experimentally created biotechnological project, taking into account legal and technical regulations and restrictions.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task

Subject contents

Fundamentals of designing biotechnological processes. Design stages. Elements of assumptions for the process design. Technological principles. Mass balance and heat balance. Elemental balance of microorganism growth, efficiency coefficients, oxygen balance, heat balance of microorganism growth. Process design elements. Scale-up of bioreactors. Similarity criteria. Thermal calculations of transient processes in biotechnological processes. The current state of knowledge related to the product and manufacturing technology - selection of the basic concept of the manufacturing method. Review of database systems for inventions and industrial designs. Principles of creating schematic diagrams, technological diagrams and scheduling equipment operation. Examples of biotechnological processes in the food industry - applied technological solutions. Examples of biotechnological processes in the pharmaceutical industry - applied technological solutions. Universal combined technological systems - cleaning and disinfection systems, measurements and automation. Organization and division of tasks in the implementation of the project. Planning experimental work. Risk assessment in the implemented topic and remedial actions.

Prerequisites and co-requisites

Basic knowledge in the field of mechanical engineering, chemical apparatus and chemical engineering and biotechnology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture colloquium	60.0%	50.0%
Project	100.0%	50.0%

Recommended reading

Basic literature

S. Bretsznajder, W. Kawecki, J. Leyko, R. Marcinkowski. Podstawy ogolne technologii przemysłowej., WNT, Warszawa, 1973
C. Ratledge, B. Kristiansen. Podstawy biotechnologii przemysłowej., PWN, Warszawa, 2011

W. Bednarski i J.Fiedurka. Podstawy biotechnologii przemysłowej, WNT, Warszawa, 2006

S. Kucharski, J. Głowinski. Podstawy obliczen projektowych w technologii chemicznej., Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2000
L. Synoradzki i J. Wisialski. Projektowanie procesow technologicznych., Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2006

	Supplementary literature	Kucharski, J. Głowinski, Podstawy obliczen projektowych w technologii chemicznej, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2000. G. Towler, R. Sinnott, Chemical Engineering Design, ButterworthHeinemann Elsevier, USA 2008 P. Lewicki: Inzynieria procesowa i aparatura przemysłu spozywczego.WNT 2005 T. Hobler: Ruch ciepła i wymienniki. WNT 1986.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Mass and heat balance of biochemical transformationsDesigning a fermentation tank using the principles of scaling upUnsteady heat transfer in a batch reactorImplementation of assumptions for the process design of the selected bioprocess.	
Work placement	Not applicable	

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