GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Industrial Microbiology, PG_00054704		
Field of study	Biotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Hubert Cieśliński	
	Teachers	dr hab. inż. Hubert Cieśliński	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

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	60	5.0	35.0	100

Subject objectives

The aim of the course is to familiarize students with the use of microorganisms, animal cells, and enzymes produced by them for the production of consumer goods. In addition, the student learns the principles of the work safety with microorganisms in the industry. Recognize the methods improve production characteristics of microorganisms performed on the needs of industry and also learns the method of improving production traits of microorganisms performed on the needs of industry.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W08	The student is able to list the goals and limitations of biotechnology. The student is able to cite examples of biotechnology applications, e.g. in medicine, industry, and environmental protection.	[SW1] Assessment of factual knowledge
K6_U04	Student is able to perform properly cultures, conduct cultures of microorganisms (including in the bioreactor). The student has a basic knowledge of running microbiological collections. The student has basic knowledge and can carry out induced mutagenesis of microorganisms. Student is able to isolate microorganisms with selected properties from environmental samples.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents	Lecture Isolation microorganisms for industrial applications from environmental samples. Microorganisms for industrial applications - methods used to improve the industrial properties of microorganisms. The storage of pure cultures for industrial applications. Cultivation conditions in industrial processes and the impact on the yield of obtained bioproducts. Presentation of selected biotechnologies: production of antibiotics (e.g. production of penicillin G and V), production of amino - acids (e.g. production of lysine), production of organic acids (e.g. production of citric acid). Production of enzymes for industrial purposes. Immobilization of enzymes – advantages and disadvantages. Bioaccumulation processes in the industrial production of copper.
Prerequisites and co-requisites	Lecture The student has to finish the subject General Microbiology (lecture and laboratory exercises).

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Writing exam	60.0%	60.0%
Tests during the term	60.0%	40.0%

Recommended reading

Basic literature	Lecture Zdzisława Libudzisz, Krystyna Kowal, Zofia Żakowska „Mikrobiologia techniczna tom 1, Mikroorganizmy i środowiska ich występowania" PWN, Warszawa, 2007. Zdzisława Libudzisz, Krystyna Kowal, Zofia Żakowska „Mikrobiologia techniczna tom 2, Mikroorganizmy w biotechnologii, ochronie środowiska i produkcji żywności" PWN, Warszawa, 2008. Hubert Cieśliński, Paweł Filipkowski, Józef Kur, Anna Lass, Marta Wanarska „Podstawy Mikrobiologii Przemysłowej" Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2007.
Supplementary literature	Lecture Praca zbiorowa Redakcja naukowa: Włodzimierz Bednarski, Arnold Reps „Biotechnologia Żywności", WNT, Warszawa, 2015.
eResources addresses	Adresy na platformie eNauczanie: Mikrobiologia Przemysłowa 2024/2025 - Moodle ID: 43358 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43358

Example issues/ example questions/ tasks being completed	1. List and describe the stages of isolation of microorganisms with biotechnological potential from environmental samples. 2. List and describe methods for improving the production properties of industrial microorganisms. 3. Describe the use of continuous culture and stationary culture in the industry. 4. Describe the methods of transient regulation of microorganism metabolism used in the production of glutamic acid by Corynebacterium glutamicum. 5. Explain the concepts of substrate induction and catabolic repression and explain their practical significance on the example of biotechnological production of penicillin G.
Work placement	Not applicable

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