



Subject card

Subject name and code	Industrial Microbiology, PG_00054704						
Field of study	Biotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Hubert Cieśliński					
	Teachers	dr hab. inż. Hubert Cieśliński dr hab. inż. Marta Wanarska dr inż. Paweł Filipkowski					
Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/user/index.php?id=4485 Moodle ID: 4485 Mikrobiologia Przemysłowa 2026 https://enauczanie.pg.edu.pl/2025/course/view.php?id=4485						
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 knows the goals and limitations of biotechnology and can give examples of its applications 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.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Course content – 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.</p> <p>Course content – laboratory Isolation and purification of proteolytic microorganisms. Assessment of the resistance of selected isolates to environmental factors. Preliminary morphological characterization of colonies of pure cultures of proteolytic isolates and cell morphology (differentiation between bacteria and fungi). Study of the effect of non-directed mutagenesis on the properties of selected proteolytic isolates. Alcoholic fermentation - assessing the concentration of substrates and products in the culture broth. Production in a bioreactor, purification of recombinant beta-D-galactosidase from the post-culture liquid, and immobilization of this enzyme on a chitosan substrate, followed by testing the enzymatic properties of the resulting preparation.</p>											
Prerequisites and co-requisites	The student has to finish the subject General Microbiology (lecture and laboratory exercises).											
Assessment methods and criteria	<table border="1" data-bbox="451 611 1487 712"> <thead> <tr> <th data-bbox="451 611 794 645">Subject passing criteria</th> <th data-bbox="794 611 1137 645">Passing threshold</th> <th data-bbox="1137 611 1487 645">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 645 794 678">Tests during the term</td> <td data-bbox="794 645 1137 678">60.0%</td> <td data-bbox="1137 645 1487 678">40.0%</td> </tr> <tr> <td data-bbox="451 678 794 712">Writing exam</td> <td data-bbox="794 678 1137 712">60.0%</td> <td data-bbox="1137 678 1487 712">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tests during the term	60.0%	40.0%	Writing exam	60.0%	60.0%
Subject passing criteria	Passing threshold	Percentage of the final grade										
Tests during the term	60.0%	40.0%										
Writing exam	60.0%	60.0%										
Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>Zdzisława Libudzisz, Krystyna Kowal, Zofia Żakowska Mikrobiologia techniczna tom 1, Mikroorganizmy i środowiska ich występowania PWN, Warszawa, 2007.</p> <p>Zdzisława Libudzisz, Krystyna Kowal, Zofia Żakowska Mikrobiologia techniczna tom 2, Mikroorganizmy w biotechnologii, ochronie środowiska i produkcji żywności PWN, Warszawa, 2008.</p> <p>Hubert Cieśliński, Paweł Filipkowski, Józef Kur, Anna Lass, Marta Wanarska Podstawy Mikrobiologii Przemysłowej" Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2007.</p> <p>Praca zbiorowa Redakcja naukowa: Włodzimierz Bednarski, Arnold Reps Biotechnologia Żywności, WNT, Warszawa, 2015.</p>										
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 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 <i>Corynebacterium glutamicum</i>. 5. Explain the concepts of substrate induction and catabolic repression and explain their practical significance on the example of biotechnological production of penicillin G. 											
Practical activities within the subject	Not applicable											

Document generated electronically. Does not require a seal or signature.