

Subject card

Subject name and code	Microorganisms in biotechnology, PG_00121248						
Field of study	Chemical Business, Chemistry, Environmental Protection						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Optional subject group		
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		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Laboratory of Bionanotechnology -> Department of Molecular Biotechnology -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Joanna Jeżewska-Frąckowiak				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Additional information: multimedia presentation, student project, student presentation, pair work, peer review						
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	30		5.0		15.0	50
Subject objectives	Familiarizing students with the issues mentioned in the lecture program content.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.		The student describes biotechnological processes carried out using microorganisms		[SW5] implementation of a problem task		
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.		The student presents the applications of microorganisms in various industrial fields in a factually correct manner, using independently selected reliable sources.		[SK2] presentation/project/paper/report		
	[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.		The student lists and characterizes groups of microorganisms used in biotechnology. The student characterizes preparations obtained using biotechnological methods, provides the method of obtaining them and examples of applications.		[SW1] oral statement/conversation/discussion		

Subject contents	Definitions of biotechnology and biotechnological process. Molecular cloning and cloning of organisms. Obtaining GMOs. Tools and techniques of molecular biotechnology. Elements of biotechnological process design. Phylogenetic tree, groups of microorganisms used in biotechnology. Sources of obtaining microorganisms for biotechnological purposes. Conventional and genetically modified microorganisms. Biotechnological applications of complete microorganisms and products obtained from them, native and recombinant enzymes. Biotechnological preparations of microbiological origin - characteristics of the production process and properties of the preparation containing microorganisms or their elements. Isolation and purification of recombinant proteins. Characteristics of selected biotechnological processes using microorganisms, examples of white, green and red biotechnology: waste management, biofuels, drugs and pharmaceuticals, food, probiotics. Legal basis for the use of microorganisms and genetically modified microorganisms in biotechnology.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	worksheet - problem tasks during the lecture	0.0%	25.0%
	presentation prepared in pairs	0.0%	75.0%
Recommended reading	Basic literature	1. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. ASM PRESS, 2009 2. Joshi VK, Singh RS: Food Biotechnology. Principles and practices. IK International Publishing House Pvt. Ltd, New Delhi, 2012 3. Klimiuk E., Łebkowska M.: Biotechnologia w ochronie środowiska, PWN, 2005 4. Libudzisz Z., Kowal K., Żakowska Z.: Mikrobiologia techniczna, tom 1, 2, PWN 2008 5. Olańczuk-Neyman K.: Laboratorium z biologii środowiska, Wyd. PG, 1998	
	Supplementary literature	6. Berkeley RM, Heyndrickx NL, De Vos P: Applications and systematics of Bacillus and relatives. Wiley-Blackwell. Oxford, 2008 7. Chavarri M, Maranon I, Villaran MC: Encapsulation Technology to Protect Probiotic Bacteria. In Probiotics. Ch23 pp 501-540. InTech, Rijeka, Rigobelo, 2012 http://dx.doi.org/10.5772/50046 8. Goderska K: Different Methods of Probiotics Stabilization. In Probiotics. Ch24 pp 541-550. InTech, Rijeka, Rigobelo, 2012 http://dx.doi.org/10.5772/50313 9. indicated on-line resources	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	An example of the use of a selected microorganism in biotechnology An idea for a biotechnological product using microorganisms	
Work placement	Not applicable		

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