



Subject card

Subject name and code	General Biotechnology, PG_00037495						
Field of study	Biotechnology						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
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 hab. inż. Dorota Martysiak-Żurowska dr inż. Paweł Filipkowski dr hab. inż. Hanna Staroszczyk prof. dr hab. inż. Agnieszka Bartoszek-Pączkowska dr hab. inż. Piotr Szweda					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	0.0	60.0	0.0	15.0	135
	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	135	9.0	6.0	150		
Subject objectives	The aim of the course is to familiarize students with the knowledge of the use of traditional and modern biotechnology methods in various areas of human life, including agriculture, processing, medicine, pharmacology and environmental protection.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W08	The student has knowledge about the course of biosynthesis, bioconversion and biotransformation of various compounds using biotechnological methods used in industry, medicine and agriculture.			[SW1] Assessment of factual knowledge		
	K6_K05	The student understands the importance and impact of biotechnological methods used in various areas of human life, especially in medicine and environmental protection.			[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U05	The student is able to carry out experimental work in the field of biotechnology and related fields.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Lecture. Classification, meaning, directions and goals for the development of modern biotechnology. Research of microorganisms on a global scale, the concept of microbiome. The shaping of biotechnology process. Culture media. Criteria for the suitability of strains for conducting an economical and safe biotechnology process. Biocatalysts and their characteristics. Examples of the use and role of enzymes in industrial practice. Enzymatic modifications of food components. Design and methods for conducting biochemical processes. Practical aspects of the use of bioreactors. Characterization and organization of fermentation processes. Examples of industrial use of ethanol fermentation (brewing, winery, distillation) and obtaining dairy fermented beverages. Cheese factories. The importance of fermentation in food preservation. Bacteriocins. Fermentative technologies of industrial waste utilization. Biotechnology in environmental protection. The development of sanitary engineering. Wastewater treatment. House cleaning. Purification of waste gases. Biofuels. Issues related to agrobiotechnology and plant biotechnology - methods of traditional plant selection, in vitro tissue cultures of plants, molecular breeding and marker assisted selection, genetic engineering and GM crops. Biotechnology of the sea - issues concerning various marine organisms and their use to create new products. Application of biotechnology in health care: secondary metabolites, antibiotics, vitamins, recombinant proteins, monoclonal antibodies, stem cells, gene therapy, tissue engineering. Metagenomics as a strategy for studying microbiome. Basic concepts and examples of applications. Genomic methods in comparative genomic studies, potential applications. Concepts: toxicogenomics, nutrigenetics and nutrigenomics, epigenetics and nutri-epigenetics, metabolomics. Examples of applications, personalized medicine and nutrition.</p> <p>Laboratory. Use of bioreactor for production of citric acid. Performing selected fermentation processes (wine, beer, bread). Toxicity biotests. Testing of the enzymatic activity of soil microflora.</p> <p>Field exercises. Practical application of biotechnology in industry: Gdańskie Wodociągi wastewater treatment plant, AMBER brewery - beer production, MIX - wine production, Destylarnia Sobieskiethyl alcohol production</p> <p>Seminar. The student discusses issues showing the latest achievements in the field of biotechnology in the field of the use of biocatalysts, new technological solutions in fermentation processes, the use of biotechnology in health care, environment, securing food resources and the production of functional food.</p>														
Prerequisites and co-requisites	General knowledge about chemistry and basics of biochemistry														
Assessment methods and criteria	<table border="1" data-bbox="448 1010 1487 1171"> <thead> <tr> <th data-bbox="448 1010 794 1043">Subject passing criteria</th> <th data-bbox="794 1010 1141 1043">Passing threshold</th> <th data-bbox="1141 1010 1487 1043">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1043 794 1077">Laboratories, tests, reports</td> <td data-bbox="794 1043 1141 1077">60.0%</td> <td data-bbox="1141 1043 1487 1077">35.0%</td> </tr> <tr> <td data-bbox="448 1077 794 1133">Participation in the seminar and presentation on a chosen topic</td> <td data-bbox="794 1077 1141 1133">60.0%</td> <td data-bbox="1141 1077 1487 1133">15.0%</td> </tr> <tr> <td data-bbox="448 1133 794 1171">Exam</td> <td data-bbox="794 1133 1141 1171">60.0%</td> <td data-bbox="1141 1133 1487 1171">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratories, tests, reports	60.0%	35.0%	Participation in the seminar and presentation on a chosen topic	60.0%	15.0%	Exam	60.0%	50.0%
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Recommended reading	Basic literature	<p>Lectures in PDF</p> <p>Ratlidge C., B. Kristiansen, Podstawy Biotechnologii, PWN W-wa, 2011</p> <p>Bal J. Biologia molekularna w medycynie. Elementy genetyki klinicznej, PWN Warszawa, 2001</p> <p>Szewczyk K.W, Technologie biochemiczne. Oficyna Wyd. Pol. Warszawskiej, Warszawa, 2003</p> <p>Praca zb. Pod red. J Synowiecki: Wybrane zagadnienia z technologii fermentacyjnych przemysłu spożywczego. Wyd. PG., Gdańsk, 2009</p> <p>Klimiuk E, M. Łebkowska. Biotechnologia w ochronie środowiska, PWN W-wa, 2004</p> <p>Collins F.S., Język Życia, DNA a rewolucja w medycynie spersonalizowanej. Wyd Laurum, 2010</p> <p>Portal internetowy - Nature Publishing Group: Nature Education</p>													

	Supplementary literature	<p>Bednarski W., Biotechnologia żywności, WNT Warszawa 2000</p> <p>Buraczewski G., Biotechnologia osadu czynnego, PWN Warszawa 1994</p> <p>Lewis M. J., T.W.Young, Piwowarstwo, PWN Warszawa 2001</p> <p>Malepszy S, Biotechnologia roślin, PWN Warszawa 2001</p> <p>Singleton P., Bakterie w biologii, biotechnologii i medycynie, PWN Warszawa 2006</p> <p>Leśniak W, Biotechnologia żywności, Procesy fermentacji i biosyntezy, Wyd. AE, Wrocław 2002</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>General characteristics of microorganisms used in biotechnological processes.</p> <p>Characterization and organization of fermentation processes.</p> <p>Fermentative technologies for the use of industrial waste.</p>	
Work placement	Not applicable	