



Subject card

Subject name and code	General Biotechnology, PG_00054746						
Field of study	Biotechnology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
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		8.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Chemistry Technology and Biotechnology of Food -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Filipkowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	60.0	0.0	15.0	105
	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	105		10.0		85.0	200
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_U05		The student is able to carry out experimental work in the field of biotechnology and related fields.		[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
	K6_K05		The student is able to interpret 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_W12		The student is able to identify activities of rational environmental management and classify chemical and biological factors, especially anthropogenic ones, having an adverse impact on the environment.		[SW1] Assessment of factual knowledge		
	K6_W08		The student is able to explain the course of biosynthesis, bioconversion and biotransformation of various compounds using biotechnological methods used in industry, medicine and agriculture.		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture 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. 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. Field exercises. Practical application of biotechnology in industry: Polpharma Biologics in Gdańsk, Pharmaceutical Plant Polpharma S.A. in Starogard Gdański, Browar Amber in Bielkówko, Mix S.A. in Kwidzyn, Gdańskie Wodociągi S.A. in Gdańsk, Starogard Distillery in Starogard Gdański. 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.		
Prerequisites and co-requisites	General knowledge about chemistry and basics of biochemistry.		
Assessment methods and criteria	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%
Recommended reading	Basic literature	Lectures in PDF Ratlidge C., B. Kristiansen, Podstawy Biotechnologii, PWN W-wa, 2011 Bal J. Biologia molekularna w medycynie. Elementy genetyki klinicznej, PWN Warszawa, 2001 Szewczyk K.W, Technologie biochemiczne. Oficyna Wyd. Pol. Warszawskiej, Warszawa, 2003 Praca zbiorowa pod red. J Synowiecki: Wybrane zagadnienia z technologii fermentacyjnych przemysłu spożywczego. Wyd. PG., Gdańsk, 2009 Klimiuk E, M. Łebkowska. Biotechnologia w ochronie środowiska, PWN W-wa, 2004 Collins F.S., Język Życia, DNA a rewolucja w medycynie spersonalizowanej. Wyd Laurum, 2010 Portal internetowy - Nature Publishing Group: Nature Education	
	Supplementary literature	Bednarski W., Biotechnologia żywności, WNT Warszawa 2000 Buraczewski G., Biotechnologia osadu czynnego, PWN Warszawa 1994 Lewis M. J., T.W.Young, Piwowarstwo, PWN Warszawa 2001 Malepszy S, Biotechnologia roślin, PWN Warszawa 2001 Singleton P., Bakterie w biologii, biotechnologii i medycynie, PWN Warszawa 2006 Leśniak W, Biotechnologia żywności, Procesy fermentacji i biosyntezy, Wyd. AE, Wrocław 2002	
		eResources addresses	
Example issues/ example questions/ tasks being completed	General characteristics of microorganisms used in biotechnological processes. Characterization and organization of fermentation processes. Fermentative technologies for the use of industrial waste.		
Practical activities within the subject	Not applicable		