

Subject card

Subject name and code	Unicellular organisms - Genetics Fundaments (M03_B2), PG_00197612						
Field of study	Biotechnology						
Date of commencement of studies	October 2025	Academic year of realisation of subject			2026/2027		
Education level	Bachelor's 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	3	ECTS credits			3.0		
Learning profile	academic	Assessment form			exam		
Conducting unit	Intercollegiate Faculty of Biotechnology Office -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Michał Obuchowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	28.0	0.0	0.0	0.0	0.0	28
	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	28		10.0		37.0	75
Subject objectives	The aim of the course is to familiarize the student with the genetics of single-celled organisms and the practical use of molecular biology of microorganisms. The student will learn the structure and organization of genomes of single-cell prokaryotic and eukaryotic organisms, the processes of regulation of DNA replication and gene expression, as well as the processes of transcription and translation. He will learn the mechanisms of introducing genetic modifications in microorganisms and the ways of using genetic modifications in biotechnology.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[BIOTECHL3_W07] The graduate has advanced knowledge of the rules of operation and the possibilities of using research techniques and tools used in biotechnology.		The student has knowledge of basic techniques and tools used to modify the genetic material of microorganisms.			[SW4] test/exam - oral or written	
	[BIOTECHL3_W01] The graduate possesses structured and advanced knowledge of biological phenomena at the molecular level and understands their importance for biotechnology.		The student knows the structure and organization of prokaryotic and eukaryotic microbial genomes and understands fundamental molecular processes such as DNA replication, transcription, translation, and gene expression regulation, relevant to biotechnology.			[SW4] test/exam - oral or written	
	[BIOTECHL3_W08] The graduate knows the principles of occupational health and safety, understands the risks associated with laboratory work, including infectious materials, GMOs and GMMs, and knows the legal regulations relating to these areas.		The student knows the principles of safe handling of microorganisms and is able to apply them in laboratory practice. The student is also familiar with the basic requirements for working with genetically modified microorganisms (GMMs).			[SW4] test/exam - oral or written	

Subject contents	<p>F1. part A Organization of the genetic material of prokaryotes and eukaryotes; regulation of replication; regulation of gene expression (i.a. operons, two-component system, QS) (16 h) Inheritance of genetic information (i.a. vertical transfer, horizontal transfer) (6 h)</p> <p>F1. part B Extrachromosomal genetic elements (i.a. IS, transposons, plasmids, gene cassettes) (2h) Basics of genetic engineering (i.a. R-M systems, CRISP-CAS, toxin-antitoxin (TA)) (4h)</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 416 786 450">Subject passing criteria</th> <th data-bbox="791 416 1137 450">Passing threshold</th> <th data-bbox="1142 416 1469 450">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 456 786 490">Part F1: A (47%) + B (13%)</td> <td data-bbox="791 456 1137 490">51.0%</td> <td data-bbox="1142 456 1469 490">60.0%</td> </tr> <tr> <td data-bbox="456 497 786 521">Integration exam</td> <td data-bbox="791 497 1137 521">50.0%</td> <td data-bbox="1142 497 1469 521">40.0%</td> </tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Part F1: A (47%) + B (13%)	51.0%	60.0%	Integration exam	50.0%	40.0%		
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Part F1: A (47%) + B (13%)	51.0%	60.0%										
Integration exam	50.0%	40.0%										
Recommended reading	<p>Basic literature</p>	<p>Molecular biology of bacteria Scientific editors: Jadwiga Baj, Zdzisław Markiewicz, PWN 2006 and later Molecular Cell Biology, 9th edition, 2021, New York : W.H. Freeman and Co., Molecular Biology of the Cell, 7th edition, 2022, Pearson Genomes 4 T.A. Brown, 2018, Garland Science and beyond Molecular Biology of the Gene, 7th edition, 2014, Pearson Script "Genetic engineering laboratory - materials for exercises" Katarzyna Węgrzyn Materials prepared by the teacher Microbiology - Jadwiga Baj (scientific ed.), Wydawnictwo Naukowe PWN SA, Warsaw 2018. Molecular biology of bacteria PWN 2006 Molecular cloning - A laboratory manual. 4th edition, (2012) Green, Sambrook</p>										
	<p>Supplementary literature</p>	<p>Microbiology: an introduction. Gerard J. Tortora, Berdell R. Funke, Christine L. Case, 2016, Pearson Prescott's Microbiology Joanne Willey [10th ed.] 2016. McGraw-Hill Education, Microbiology Murray Rosenthal 2018 Edition EDRA URBAN & PARTNER Brock biology of microorganisms, global edition, 15/e M. T. Madigan, K. S. Bender, D. H. Buckley, W. M. Sattley, D. A. Stahl, 2018. Pearson. Principles of Biochemistry, Lehninger, edition, 7th edition 2017, Freeman Concepts of Genetics, 10th edition, 2012, Pearson Sherman F., (2002) Getting started with yeast. Methods Enzymol. 350: 3-41. The Yeasts: Yeast Technology (2012) Anthony H. Rose, J. Stewart Harrison Guide to Yeast Genetics and Molecular Biology. (2004) Christine Guthrie, Gerald R. Fink</p>										
	<p>eResources addresses</p>											
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											

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