University of Gdańsk

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	dr hab. Dorota Krzyżanowska	
	Teachers	dr hab. Dorota Krzyżanowska dr hab. Katarzyna Węgrzyn prof. dr hab. Igor Konieczny prof. dr hab. Michał Obuchowski	

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 knowlegde 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

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)

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)

Prerequisites and co-requisites

Assessment methods and criteria

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%

Recommended reading

Basic literature	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. 4thedition, (2012) Green, Sambrook
Supplementary literature	Microbiology: an introduction. Gerard J. Tortora, Berdell R. Funke, Christine L. Case, 2016, Pearson Prescott's MicrobiologyJoanne 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
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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