University of Gdańsk

Subject card

Subject name and code	Unicellular organisms - Genetics Fundaments (M03_B2), PG_00153673		
Field of study	Biotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	undergraduate studies	Subject group	
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish Most of the literature provided is in English - there are no Polish equivalents or translations.
Semester of study	3	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Dziekanat MW Biotechnologii -> Intercollegiate Faculty of Biotechnology UG-MUG		
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	0.0	30.0	58

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 (BIOTECHL3_W01). He will learn the mechanisms of introducing genetic modifications in microorganisms (BIOTECHL3_W07) and the ways of using genetic modifications in biotechnology (BIOTECHL3_W08).

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_W01] The graduate knows and understands basic biological phenomena at the molecular level, he/she is familiar with their significance for biotechnology.	The student is familiar with the genetics of single-cell organisms and the practical use of genetic engineering of microorganisms.	[SW4] test/exam - oral or written
[BIOTECHL3_W07] The graduate knows and understands basic techniques and research tools used in biotechnology.	The student knows how to analyze the basic processes occurring in the cell regarding nucleic acids and proteins.	[SW4] test/exam - oral or written
[BIOTECHL3_W08] The graduate knows and understands occupational health and safety regulations; the dangers of working in a laboratory; the dangers of working with infectious material, GMOs and GMMs	The student knows the principles of safe work with microorganisms and knows how to work safely in the laboratory. Knows the principles of working with infectious material and GMO and GMM organisms.	[SW4] test/exam - oral or written

Subject contents

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)
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)

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="2"></td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>part B (13 points)</td><td>0.0%</td><td>13.0%</td></tr>
<tr><td>part A (47 points)</td><td>0.0%</td><td>47.0%</td></tr>
<tr><td>Integration exam (40 punktów)</td><td>0.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>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</td></tr>
<tr><td>Supplementary literature</td><td>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</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2"></td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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