University of Gdańsk

Subject card

Subject name and code	Unicellular organisms - Metabolism Methodology (M03_B3), PG_00196919		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Optional subject group 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	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Research and Development Laboratory -> UG Institute of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Natalia Kaczyńska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	17.0	0.0	0.0	17

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	17	5.0	28.0	50

Subject objectives

The aim of the course is to familiarize the student with the metabolic processes of microorganisms, taking into account their living environment. The student will acquire the skills necessary for conducting laboratory work involving microorganisms safely (independently or in a group). The student will be able to analyze, evaluate, and discuss the obtained results and draw conclusions based on them. In case of an experimental failure, the student will be able to identify putative causes. The student will gain awareness of the safety principles necessary for studing microorganisms.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_U02] The graduate is able to plan and organise work effectively, independently or as part of a team, in particular work in a laboratory	The student is able to plan microbiological experiments and organize team work, including assigning roles and using tools for collaboration and data sharing.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[BIOTECHL3_W02] The graduate knows and understands at an advanced level selected processes at the cell, tissue, and organism level, important from the biological point of view	The student is able to solve research tasks related to the metabolism of bacteria and yeasts. The student explains the relationships between environmental conditions and microbial enzymatic activity, describes the mechanisms of action of bacteriocins, antibiotics, and phytoncides, and explains the role of yeast mitochondria in cellular energy metabolism.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task
[BIOTECHL3_K04] The graduate is aware of the importance of occupational safety rules, is able to apply them and react in hazardous situations, ensuring their own safety and the safety of others.	The student follows safety rules when working with microorganisms, uses personal protective equipment (such as a lab coat and gloves), and properly carries out the segregation of biological waste.	[SK6] demonstration of practical skills [SK8] observation of student's independent or team work

Subject contents

Laboratory Classes

M1. Bacterial Metabolism; LAB13 (12 hours)

- Growth curve, growth rate, generation time, cultivation methods for aerobic and anaerobic bacteria.
- Determination of enzymatic activity (oxidase, catalase, proteases, amylases) in microorganisms.
- Assessment of the ability to utilize various carbon and nitrogen sources; different types of fermentation.
- Use of various culture media to study microbial metabolism and for microbial identification.
- Investigation of the ability of bacteria and actinomycetes to produce bacteriocins and antibiotics; testing microbial susceptibility to antibiotics (antibiogram), bacteriocins (colicins and staphylococcins), and phytoncides.

M2. Yeast Metabolism; LAB4 (5 hours)

- Isolation of mitochondria and analysis of mitochondrial enzyme activity

Depending on the chosen group, students attend classes in either Polish or English, gaining subject knowledge in the selected language while building discipline-specific vocabulary.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Parts M1 (80%) + M2 (20%)	51.0%	100.0%

Recommended reading	Basic literature	• Życie bakterii Kunicki-Goldfinger, red. J. Baj, Z. Markiewicz, Wydawnictwo Naukowe PWN, W-wa 2005 i późniejsze • Mikrobiologia techniczna. T. 1 Mikroorganizmy i środowiska ich występowania (wybrane rozdziały) - Zdzisława Libudzisz (red.), Krystyna Kowal (red.), Zofia Żakowska (red.), 2007, Wydawnictwo Naukowe PWN • Mikrobiologia Murray Rosenthal Wydanie 2018 EDRA URBAN & PARTNER • Microbiology: an introduction. Gerard J. Tortora, Berdell R. Funke, Christine L. Case, 2016, Pearson • Prescotts Microbiology Joanne Willey[10th ed.] 2016. McGraw-Hill Education, • 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. • Cappuccino, James G.; Welsh, Chad T, Microbiology: A Laboratory Manual, Global Edition Pearson Education Limited : Pearson, 2017 • Skrypt Pracownia inżynierii genetycznej materiały do ćwiczeń Katarzyna Węgrzyn
	Supplementary literature	• The Yeasts: Yeast Technology (2012) Anthony H. Rose, J. Stewart Harrison • Scheffler I. E. Mitochondria. 2nd edition. Wiley 2007
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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