University of Gdańsk

Subject card

Subject name and code	Biotechnology in medicine - The human organism - homeostasis and the pathological state - Methodology (M05_B1), PG_00197675						
Field of study	Biotechnology						
Date of commencement of studies	October 2024		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	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	4.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Grzegorz Stasiłojć				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	2.0	0.0	56.0	0.0	4.0	62
	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	62		5.0	33.0	100	
Subject objectives	By fusing practical laboratory skills with histology, cytology, and toxicological knowledge, Block 1-Methodology aims to educate students for advanced cellular studies, including evaluating the effects of external influences on human health.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_W07] The graduate knows and understands basic techniques and research tools used in biotechnology.	Student know the methodology related to the analysis of the cell in the pathological state and the related specific conceptual apparatus and terminology.	[SW4] test/exam - oral or written [SW3] text preparation/written work
[BIOTECHL3_W09] The graduate knows and understands the basic concepts and terminology used in biological and medical sciences as well as concepts from related scientific disciplines	Basic terms used in histology, cytology, and toxicology, such as cellular homeostasis, apoptosis, necrosis, or mechanisms of cellular adaptation, will be familiar to the student. He or she is aware of the ultrastructural makeup of tissues and cells and is able to connect molecular functional abnormalities to morphological changes. The student or students comprehend the cellular and tissue-level modes of action of certain hazardous agents (chemical, physical, and biological).	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BIOTECHL3_K04] The graduate is willing to understand the importance of work safety rules, in particular laboratory work; apply the principles of work safety; be responsible for his/her own safety and that of others; be able to act in emergency situations.	The student is aware of the importance of safety rules, possible risks and responsibility for the safety of others. Student knows the rules of working in laboratories with different levels of BSL and understands the risks associated with the various levels of biosafety.	[SK3] text preparation/written work [SK5] implementation of a problem task
[BIOTECHL3_W04] The graduate knows and understands the structure and functions of the body in terms of anatomy, histology, physiology relevant from the point of view of medicine	The student is able to characterize the microscopic and macroscopic structure of the main organs and systems of man, linking their structure to their functions. The student understands the basic physiological mechanisms underlying the functioning of the human organism at the cellular, tissue and organ levels. The student is able to explain the relationship between structure and function at different levels of organization of the organism.	[SW4] test/exam - oral or written [SW3] text preparation/written work
[BIOTECHL3_U08] The graduate is able to learn independently in a targeted manner	The student is able to study independently from the indicated materials including scripts and presentations. The student is able to take notes to reproduce the experiments performed. The student is able to conduct a review of the scientific literature in Polish and English, and then synthesize the information obtained in a coherent and logical manner.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work
[BIOTECHL3_U06] The graduate is able to prepare a targeted written study in Polish and/or English, covering detailed issues in the field of biotechnology, using scientific language, including specialist terminology and conceptual apparatus appropriate for biotechnology	The student is able to prepare a detailed report on the ecotoxicological risk assessment of a selected chemical substance, taking into account current guidelines and standards. The student is able to correctly apply specialized ecotoxicological terminology in the prepared study. The student is able to present the results of his analysis in a clear and comprehensible manner for an audience of varying levels of sophistication.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU8] observation of student's independent or team work

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_U01] The graduate is able to do basic laboratory work; document activities and results; use basic techniques under the supervision of the supervisor in laboratory work and research tools necessary in biotechnology, with particular emphasis on the analysis of methods of isolation, modification, selection and analysis of organisms, tissues, cells and molecules; handle basic laboratory equipment.	The student/graduate is able to independently perform basic laboratory experiments related to animal cell culture. The student/graduate interprets the obtained results and draws conclusions from them, and documents his/her work clearly and accurately. The student(s) will recognize tissues and organs on the basis of analysis of histological preparations. The student(s) will work safely in the laboratory and follow the applicable standards. The student will be able to work independently and in a team. The student will be able to plan and organize his/her work. The student will be able to analyze test results and draw conclusions from them.	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU6] demonstration of practical skills [SU8] observation of student's independent or team work

Subject contents

- **Methodology 1 - Proseminar.** Methods of analyzing a cell in a pathological state
- **Methodology 2- Seminar.** Prospective ecotoxicological risk assessment of a chemical compound
- **Methodology 3 - Laboratory classes (Histology)**
- Analysis of the structure and function of human organs and their systems: histological analysis of human organs forming systems: cardiovascular, respiratory, digestive including accessory organs, endocrine, urinary, nervous including organs of sight, hearing and balance, and Reproductive organs and skin with its appendages; linking structure to function
- **Methodology 4 - Laboratory classes in animal cell culture.**
- Safety signs and labeling of hazardous substances.
- Basics of aseptic work.
- The ability to properly and safely operate equipment.
- Passage of cells (suspension, adherent) and induction of death.
- Counting and viability assessment. Freezing and thawing of cells Identification of infection by Mycoplasma.
- Proliferation assay. Cell cycle analysis. Hemolytic test. Analysis of membrane proteins by flow cytometry and Fluorescence microscopy.
- Characterization of cell morphology

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
M3 - practical classes in detailed Histology	51.0%	50.0%
M1 + M2 - Methods of analyzing a cell in a pathological state + Prospective ecotoxicological risk assessment of a chemical compound	51.0%	9.0%
M4 - practical classes in animal cell culture	51.0%	41.0%

Recommended reading

Basic literature	• Medical Biochemistry. J. Baynes, M.H. Dominiczak, Mosby, London 2003 • Alberts et al. Fundamentals of cell biology. PWN 2009 or newer edition • Histological atlas, edited by A. Myśliwski, OPERON, 2002. • Animal Cell Culture, R.I. Freshney 4th ed 2012 • Cell and tissue culture, S. Stokłosa 1st ed. 2012 • Literature sources provided in lecture materials
Supplementary literature	• Textbook of Biochemistry with Clinical Correlations. Ed. T.M. Devlin, Wiley-Liss, New York 2002 (or later editions). • Fundamentals of ecotoxicology. C.H. Walker, S.P. Hopkin, R.M. Silby, D.B. Peakall, PWN Scientific Publishers, Warsaw 2002 • Junqueira's Basic Histology: Text and Atlas, McGraw-Hill Education/Lange 2018- Histology. Textbook for students of medicine and dentistry Medical Publishing House Urban & Partner 2013 ed. Maciej Zabel • Atlas of histology, Sobotta and Hammersen, Urban & Partner, 2002 • Molecular Biology of the Cell, Fifth Edition (or newer), by: Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, KeithRoberts and Peter Walter, Gerland Science Publishing, 2008 • Molecular Cell Biology, Fifth Edition (or newer), by: Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger,Matthew P. Scott, Freeman Publishers, W. H. & Company, 2003 • Web site materials: www.lgcstandards-atcc.org; www.sivb.org
eResources addresses	

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable

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