

Subject card

Subject name and code	Biomolecules - structure, synthesis and properties Methodology (M02_B1), PG_00166869						
Field of study	Biomolekuły – Budowa, synteza i właściwości Metodologia (M02_B1)						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		6.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Katarzyna Węgrzyn				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	85.0	0.0	0.0	85
	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	85		30.0		50.0	165
Subject objectives	Program block 01 in Module 02 aims to provide detailed knowledge about the structure and properties of biomolecules (such as active low- and medium-molecular-weight compounds as well as proteins, nucleic acids, sugars and lipids) that create more complex biological systems, cellular compartments. The student will acquire practical skills related to the use of biomolecule isolation methods and their biochemical, biophysical and bioinformatic analysis. The student will gain awareness of safety rules for working in the laboratory and will acquire competences to work independently and in a team.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 knows and follows the safety rules applicable in the laboratory, identifies potential hazards, and takes appropriate actions in emergency situations.	[SK1] wypowiedź ustna/rozmowa/ dyskusja [SK4] test/egzamin - ustny lub pisemny [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[BIOTECHL3_K02] The graduate is willing to work in a team, in particular to carry out joint laboratory work.	The student can work in a team when carrying out laboratory tasks (shares responsibilities, actively participates in discussions, and contributes to the joint analysis of results).	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[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 has practical skills related to the use of methods for the isolation of biomolecules and their biochemical, biophysical and bioinformatic analysis. Is able to document activities and results of analyzes performed.	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny [SU6] demonstracja umiejętności praktycznych [SU8] obserwacja samodzielnej lub zespołowej pracy studenta
Subject contents	M1. Laboratory exercises (computer room) Bioinformatic methods in the analysis of nucleic acids and proteins • Identification and retrieval of information related to nucleotide and amino acid sequences • Visualization of the spatial structures of biomolecules • Basic taxonomic and evolutionary analysis of biomolecules • Identification of metabolic pathways M2. Laboratory exercises 1. Basic calculations in laboratory work 2. Carbohydrates • thin layer chromatography 3. Nucleic acids • Genomic DNA isolation • plasmid DNA isolation • determination of phosphates in RNA and DNA • PCR and agarose electrophoresis of nucleic acids 4. Proteins • Salting out proteins • Protein electrophoresis under denaturing conditions, • Coomassie Blue staining • Protein overproduction in the bacterial system and its purification (affinity chromatography) • Protein electrophoresis under denaturing conditions, silver staining • Molecular filtration • protein immunodetection - Western blotting, ELISA • protein immunodetection - ELISA 5. Lipids • Extraction of lipids from various biological materials and analysis of the lipid composition of the obtained extracts • Analysis of the fatty acid composition of selected lipids and detection of selected isoprenoids		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	M1(15%) + M2(85%)	51.0%	100.0%

Recommended reading	Basic literature	• A guide to exercises on the biochemical and biophysical basis of plant development. A. Banaś, K. Jasieniecka-Gazarkiewicz, K. Demski. 2017. University of Gdańsk Publishing House. ISBN: 978-83-7865-558-9 • A collection of biochemistry exercise protocols developed at the Department of Molecular Enzymology, MWB, UG and MUG (materials available on the GUMed extranet). • Molecular cloning A laboratory manual by Sambrook, Fritsch and Maniatis • Molecular cloning A laboratory manual. 4th edition, (2012) Green, Sambrook • Script "Laboratory of Genetic Engineering - materials for students" Katarzyna Węgrzyn
	Supplementary literature	• Exercises in biochemistry, edited by Leokadia Kłyszewko-Stefanowicz, Ed. Naukowe PWN, Warszawa 2005 • Exercises in chemistry and biochemistry, edited by Teresa Stelmaszyńska-Zgliczyńska and Piotr Leidler, Ed. Jagiellonian University, Kraków 2001, Biochemistry. • Practical classes for students of medicine, dentistry and pharmacy, edited by Marusz M. Żydowo, ed. IV amendment, MAKmed, Gdańsk 1997
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.