

Subject card

Subject name and code	Biomolecules - biological functions Methodology (M02_B2), PG_00153664						
Field of study	Biomolekuły - Funkcje biologiczne Metodologia (M02_B2)						
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		5.0		
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	8.0	47.0	0.0	0.0	55
	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	55		15.0		32.0	102
Subject objectives	The program block 02 in Module 02 aims to provide detailed knowledge about the functions of biomolecules (such as proteins, nucleic acids, sugars, and lipids) forming more complex biological systems, cellular compartments. By completing the program block, the student will acquire practical skills related to the analysis of enzyme reaction kinetics, determination of kinetic constants, and statistical processing of measurement data. Additionally, the student will gain competencies for independent work and teamwork.						

Learning outcomes	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 is able to carry out basic analyses related to optical and kinetic measurements in biochemistry. They are able to document the procedures and results of the conducted analyses.	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
	[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_U03] The graduate is able to use basic mathematical and statistical methods to describe phenomena and analyse data; analyse basic data in professional databases used in biotechnology	Student has practical skills related to the analysis of enzyme reaction kinetics, determination of kinetic constants, and statistical processing of measurement data.	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
Subject contents	M1. Statistical Analysis of Measurement Results (laboratory exercises - computer room) - Importing measurement data into a spreadsheet - Preparing measurement data for analysis - Determining the mean, standard deviation, and standard error of measurement data - Using the equation of a line, correlation coefficient, linear extrapolation, and interpolation for data analysis M2. Light and Optical Measurements in Biochemistry (laboratory exercises) - Fluorescence, application of fluorimetric measurements in studying biomolecules, buffer preparation - Optical measurements in studying biomolecules - Particle-wave nature of light (use of lasers, prism) M3. Enzyme Reaction Kinetics (laboratory exercises) - Determining the order of the enzyme reaction - Determining kinetic constants for the enzyme reaction - Effect of competitive and non-competitive inhibitors on enzyme activity - Enzymatic determination of substrate concentration M4. Enzyme Kinetics (auditory exercises) - Determining enzymatic constants - Absorption, Lambert-Beer law - Molar, specific rate M5. Semipermeable Membranes, Diffusion (auditory exercises) - Diffusion - Osmotic pressure - Properties of the semipermeable membrane - Membrane equilibria M6. Elements of Bioenergetics and Thermodynamics (auditory exercises)		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	M1-M7	51.0%	100.0%

Recommended reading	Basic literature	Laboratory Exercises - Computer Room - Andrzej Stanisław, Accessible Statistics Course. Volume 1. Basic Statistics, StatSoft Publishing, Kraków 2006 - Materials prepared by the Instructor Laboratory Exercises - Script "Biophysics with Elements of Physics" by S. Ziętkiewicz - Script in English "Biophysics - Laboratory Classes" by S. Ziętkiewicz Auditory Exercises - Bioenergetics 2 by GD Nicholls, SJ Fergusson, PWN - Biochemical Calculations by A. Zgierski, R. Gondko, PWN - Biophysics for Biologists by M. Bryszewska, W. Leyko, PWN - Script "Biophysics with Elements of Physics" by S. Ziętkiewicz - Script in English "Biophysics - Laboratory Classes" by S. Ziętkiewicz - Molecular Biology of the Cell, Fifth Edition (or newer - we currently have the fifth edition), by Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter, Garland 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 W. H. & Company Publishing, 2003.
	Supplementary literature	Materials independently searched for and selected by students for the classes using library resources and electronic information sources
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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