University of Gdańsk

Subject card

Subject name and code	Biomolecules - biological functions Methodology (M02_B2), PG_00196900		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	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	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	10.0	60.0	125

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 possesses practical skills in performing laboratory procedures, documenting results, and applying techniques necessary in biotechnology, including methods of isolation, modification, selection, and analysis of organisms, tissues, cells, and molecules; has the ability to operate advanced laboratory.	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] oral statement/conversation/ discussion [SU3] text preparation/written work [SU4] test/exam - oral or written
[BIOTECHL3_U03] The graduate applies mathematical and statistical methods to describe phenomena and analyze data and is able to use 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] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written
[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] observation of student's independent or team work

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 Stanisz, 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. Zgirski, 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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