

**Subject card**

<b>Subject name and code</b>	Biomolecules - biological functions Methodology (M02_B2), PG_00196900						
<b>Field of study</b>	Biotechnology						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2026/2027		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	1	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	2	<b>ECTS credits</b>			5.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>							
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Katarzyna Węgrzyn				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	8.0	47.0	0.0	0.0	55
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM		
	<b>Number of study hours</b>	55	10.0	60.0	125		
<b>Subject objectives</b>	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.						
<b>Learning outcomes</b>	<b>Course outcome</b>		<b>Subject outcome</b>		<b>Method of verification</b>		
	[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	<p>M1. Statistical Analysis of Measurement Results (laboratory exercises - computer room)</p> <ul style="list-style-type: none"> <li>• Importing measurement data into a spreadsheet</li> <li>• Preparing measurement data for analysis</li> <li>• Determining the mean, standard deviation, and standard error of measurement data</li> <li>• Using the equation of a line, correlation coefficient, linear extrapolation, and interpolation for data analysis</li> </ul> <p>M2. Light and Optical Measurements in Biochemistry (laboratory exercises)</p> <ul style="list-style-type: none"> <li>• Fluorescence, application of fluorimetric measurements in studying biomolecules, buffer preparation</li> <li>• Optical measurements in studying biomolecules</li> <li>• Particle-wave nature of light (use of lasers, prism)</li> </ul> <p>M3. Enzyme Reaction Kinetics (laboratory exercises)</p> <ul style="list-style-type: none"> <li>• Determining the order of the enzyme reaction</li> <li>• Determining kinetic constants for the enzyme reaction</li> <li>• Effect of competitive and non-competitive inhibitors on enzyme activity</li> <li>• Enzymatic determination of substrate concentration</li> </ul> <p>M4. Enzyme Kinetics (auditory exercises)</p> <ul style="list-style-type: none"> <li>• Determining enzymatic constants</li> <li>• Absorption, Lambert-Beer law</li> <li>• Molar, specific rate</li> </ul> <p>M5. Semipermeable Membranes, Diffusion (auditory exercises)</p> <ul style="list-style-type: none"> <li>• Diffusion</li> <li>• Osmotic pressure</li> <li>• Properties of the semipermeable membrane</li> <li>• Membrane equilibria</li> </ul> <p>M6. Elements of Bioenergetics and Thermodynamics (auditory exercises)</p>								
Prerequisites and co-requisites									
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 1072 798 1104">Subject passing criteria</th> <th data-bbox="802 1072 1139 1104">Passing threshold</th> <th data-bbox="1144 1072 1477 1104">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1111 798 1144">M1-M7</td> <td data-bbox="802 1111 1139 1144">51.0%</td> <td data-bbox="1144 1111 1477 1144">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	M1-M7	51.0%	100.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>Laboratory Exercises - Computer Room</p> <ul style="list-style-type: none"> <li>• Andrzej Stanisław, Accessible Statistics Course. Volume 1. Basic Statistics, StatSoft Publishing, Kraków 2006</li> <li>• Materials prepared by the Instructor</li> </ul> <p>Laboratory Exercises</p> <ul style="list-style-type: none"> <li>• Script "Biophysics with Elements of Physics" by S. Ziętkiewicz</li> <li>• Script in English "Biophysics - Laboratory Classes" by S. Ziętkiewicz</li> </ul> <p>Auditory Exercises</p> <ul style="list-style-type: none"> <li>• Bioenergetics 2 by GD Nicholls, SJ Fergusson, PWN</li> <li>• Biochemical Calculations by A. Zgirski, R. Gondko, PWN</li> <li>• Biophysics for Biologists by M. Bryszewska, W. Leyko, PWN</li> <li>• Script "Biophysics with Elements of Physics" by S. Ziętkiewicz</li> <li>• Script in English "Biophysics - Laboratory Classes" by S. Ziętkiewicz</li> <li>• 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.</li> <li>• 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. &amp; Company Publishing, 2003.</li> </ul> <p>Materials independently searched for and selected by students for the classes using library resources and electronic information sources</p>							
Example issues/ example questions/ tasks being completed									
Work placement	Not applicable								

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