University of Gdańsk

Subject card

Subject name and code	Biomolecules - biological functions Foundation (M02_B2), PG_00196899		
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	2.0
Learning profile	academic	Assessment form	exam
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	20.0	0.0	0.0	0.0	0.0	20

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	20	5.0	25.0	50

Subject objectives

The program block 02 in Module 02 aims to provide advanced 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 advanced knowledge about the network of interactions between biomolecules and their transport. The student will also gain advanced knowledge related to the analysis of enzyme reaction kinetics, determination of kinetic constants, and statistical processing of measurement data.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_W06] The graduate possesses structured and advanced knowledge of exact and natural sciences necessary to understand biological phenomena and processes, in particular cellular processes at the molecular level.	Student has advanced knowledge about the functions of biomolecules (such as proteins, nucleic acids, sugars, and lipids) forming more complex biological systems, cellular compartments. Student knows about the network of interactions between biomolecules and their transport. The student has also advanced knowledge related to the analysis of enzyme reaction kinetics, determination of kinetic constants, and statistical processing of measurement data.	[SW4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>F1. Structural Proteins of the ECM and Cytoskeleton (models collagen, myosin, actomyosin)

F2. Monomeric and Oligomeric Proteins (models myoglobin and hemoglobin)

F3. Enzymes

• kinetics
• catalytic strategies
• regulatory strategies

F4. Cell Membranes

• description of thermodynamic equilibria/non-equilibria, simple diffusion, Fick's law,
• membrane permeability, simple diffusion through membranes, facilitated diffusion, osmosis, diffusion of charged particles (electrochemical potential), Donnan equilibrium, membrane potential,
• active transport, ion transport and its connection to membrane potential and the use of energy stored in the ion gradient for selected cellular processes (nerve impulse transmission, colorless vision process, ATP synthesis, etc.)
• membrane channels and pumps

F5. Structure and Function of Cellular Receptors and Signal Transducers

• ligands, receptors, activation, and inhibition of proteins
• main types of signaling pathways, biological effects of signaling</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>F1-F5</td><td>51.0%</td><td>60.0%</td></tr>
<tr><td>Integration exam</td><td>50.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>• Basics of Biophysics. A Textbook for Medical Students, edited by Andrzej Pilawski, PZWL
• Biophysics for Biologists. Edited by M. Bryszewska, W. Leyko, PWN
• 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.</td></tr>
<tr><td>Supplementary literature</td><td>Materials independently searched for and selected by students for the classes using library resources and electronic information sources</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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