

Subject card

Subject name and code	Biomolecules - biological functions Foundation (M02_B2), PG_00153662						
Field of study	Biotechnology						
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		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		0.0		18.0	38
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 detailed knowledge about the network of interactions between biomolecules and their transport. The student will also gain 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 knows and understands basic knowledge in science and natural sciences necessary for understanding the phenomena and biological processes, particular cellular processes at the molecular level		Student has the knowledge about the functions of biomolecules (such as proteins, nucleic acids, sugars, and lipids) forming more complex biological systems, cellular compartments. Stuenet knows about the network of interactions between biomolecules and their transport. The student has also 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		

Subject contents	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. Basics of 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		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	F1-F5	51.0%	60.0%
	Integration exam	50.0%	40.0%
Recommended reading	Basic literature	• Basics of Biophysics. A Textbook for Medical Students, edited by Andrzej Pilawski, PZWŁ • 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.	
	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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