

Subject card

Subject name and code	Biochemistry, PG_00188303						
Field of study	Biochemia (Wykład)						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Laboratory of Bioorganic Chemistry -> Department of Molecular Biochemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Krzysztof Rolka				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	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	30		10.0		35.0	75
Subject objectives	To introduce students to all topics listed in the lecture content, including: • basic groups of endogenous organic compounds, their structure and functions, • fundamental metabolic pathways and their interrelationships, • development of independent analytical skills in biochemistry, and understanding the role of biochemistry in forensic analytics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_K01] The graduate is ready to critically evaluate their own knowledge, understand its importance for solving cognitive and practical problems, and to seek expert opinions when necessary.	The student is prepared to critically evaluate their knowledge of biochemistry and its applications in solving cognitive and practical problems, understands the need for continuous updating of knowledge in the field of biochemistry in the context of scientific progress, and is able to seek expert opinions in cases of complex biochemical issues requiring specialized knowledge.	[SK4] test/egzamin - ustny lub pisemny
	[AKRL3_W01] The graduate knows and understands, at an advanced level, the laws and theories in the field of chemistry, as well as the basics of biology, mathematics and law constituting general knowledge in the scientific disciplines forming the theoretical foundations relevant to the study program.	The student knows and understands at an advanced level the fundamental laws, concepts, and theories in the field of biochemistry, including: the structure and functions of biomolecules (proteins, lipids, carbohydrates, nucleic acids), the mechanisms of metabolic transformations and their regulation, the principles of thermodynamics and kinetics of biochemical reactions, understands the interrelations between biochemical processes, organism physiology, and chemical and biological phenomena, is able to interpret basic biochemical relationships in the context of health and disease.	[SW4] test/egzamin - ustny lub pisemny
Subject contents	High-energy compounds. Thermodynamics of biochemical processes. Classification, structure, and function of enzymes. Kinetics of catalytic processes. Carbohydrates, lipids, peptides, and proteins structure and functions. Structure of membranes and cell walls. Metabolic processes glycolysis, oxidative decarboxylation, Krebs cycle, oxidative phosphorylation, glycogen metabolism, pentose phosphate pathway, gluconeogenesis, fatty acid metabolism, amino acid metabolism. Photosynthesis. Nucleic acids DNA and RNA: replication, transcription, genetic code, protein biosynthesis. DNA recombination. PCR. Genetic engineering. Biochemical mechanisms of xenobiotic metabolism: detoxification and biotransformation of foreign substances (e.g., drugs, toxins). The significance of xenobiotic metabolism in toxicology and forensic science.		
Prerequisites and co-requisites	Organic chemistry, first-cycle studies, basic knowledge of organic chemistry, ability to work in a chemical laboratory, knowledge of basic laboratory glassware, and understanding of the principles of work in a biochemistry laboratory.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam – 5 open-ended questions; duration: 90 minutes.	50.0%	100.0%
Recommended reading	Basic literature	J. M. Berg, J. L. Tymoczko, L. Stryer, <i>Biochemistry</i> , PWN, Warsaw 2009 and subsequent editions.	
	Supplementary literature	Other academic textbooks on biochemistry.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	- Propose metabolic pathways in which L-alanine would serve as an energy source. - Present the metabolic pathways of glycogen using chemical reactions. Characterize the significance of this polysaccharide. - A solution contains five proteins, including chymotrypsin and a trypsin inhibitor. Propose an experiment that would allow the isolation and identification of both proteins. - Describe the mechanism of protein biosynthesis. - Why does the formation of ketone bodies occur in the case of carbohydrate deficiency in the body? Justify your answer with chemical reactions.		
Work placement	Not applicable		

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