

Subject card

Subject name and code	Biochemistry, PG_00103518						
Field of study	Environmental Protection						
Date of commencement of studies	October 2025		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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		2.0		
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	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		33.0	50
Subject objectives	To acquaint students with all issues mentioned in the lecture contents.To introduce students to the basic endogenous organic compounds, their structure and functions.To acquaint students with selected metabolic pathways and relations between them.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OŚL3_U07] Uses basic laboratory techniques, conducts field research and performs qualitative and quantitative analyses and draws conclusions on this basis for practical purposes.	Uses basic analytical techniques used in analysis endogenous organic compounds.	[SU4] test/exam - oral or written
	[OŚL3_K05] Identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development.	Understands the need for continuous education.	[SK4] test/exam - oral or written
	[OŚL3_W01] Discusses the basic concepts of mathematics, physics, chemistry and biology. Describes physical, chemical and biological phenomena occurring in nature as well as geological, geomorphological and climatic conditions of the functioning of nature.	Defines and demonstrates chemical structure of basic groups of bio- and macromolecules. Describes and illustrates selected metabolic pathways using chemical reactions, explains their importance for the body functioning.	[SW4] test/exam - oral or written
	[OŚL3_K08] Is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work.	Is aware of the need to critically analyze one's own work. Demonstrates cautious criticism in accepting information, especially available in the mass media. Is aware of honest and reliable work.	[SK4] test/exam - oral or written
	[OŚL3_U02] Plans, selects appropriate research and measuring equipment and devices, performs physicochemical measurements and experiments; analyses the results and draws conclusions based on them.	Designs and performs simple biochemical experiments, selecting laboratory equipment according to its purpose. Analyzes and interprets the results of experiments and draws conclusions regarding the correctness of their course.	[SU4] test/exam - oral or written
	[OŚL3_U11] Uses statistical methods as well as algorithms and IT techniques, including application software packages to describe environmental experiments and analysis of typical data in socio-economic activities based on science and natural sciences.	Uses chemical terminology to the extent necessary to present (in written and oral form) the course content. Predicts the physicochemical and biological properties of organic compounds based on their chemical formulas.	[SU4] test/exam - oral or written
Subject contents	Energy-rich compounds, thermodynamics of biochemical reactions. Classification, structures and functions of enzymes. Mechanisms of enzyme catalysis. Carbohydrates, lipids and proteins structures and functions. Biological membranes structure and functions. Metabolic pathways: glycolysis, gluconeogenesis, pyruvate decarboxylation, Krebs cycle, oxidative phosphorylation, glycogen metabolism, fatty acids metabolism, amino acids metabolism, Proteins G and signal transduction. Photosynthesis. DNA and RNA: replication, transcription, translation.		
Prerequisites and co-requisites	organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam - 5 open questions covering the content of the lecture and laboratory classes; duration 90 min	51.0%	100.0%

Recommended reading	Basic literature	J. M. Berg, J. L. Tymoczko, L. Stryer, Biochemia, PWN, Warszawa 2009 and subsequent editions
	Supplementary literature	Other academic textbooks for biochemistry
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Define glycolysis and explain its role in the generation of metabolic energy. If the C-1 carbon of glucose were labeled with ^{14}C, which of the carbon atoms in pyruvate would be labeled after glycolysis? Answer should be explained with chemical reactions 2. Describe the mechanism of DNA replication 3. Outline the catalytic mechanism of serine proteinases and possible mechanisms of their inhibition 4. Outline metabolic pathways of L-alanine 5. Aqueous solution contains 5 proteins, among them one is trypsin inhibitor and one is chymotrypsin inhibitor. Propose an experiment that would allow to isolate and identify them in pure form.	
Work placement	Not applicable	

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