

Subject card

Subject name and code	Biochemistry, PG_00081918						
Field of study	Chemistry						
Date of commencement of studies	October 2025		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	2		Language of instruction		Polish		
Semester of study	4		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		5.0		40.0	75
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 basic metabolic pathways and relations between them;						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_K06] Raises her/his professional and personal competences by using information provided in various sources.	Understands the need of continuous education. Shows cautious criticism when acquiring knowledge, especially these coming from mass media.	[SK4] test/exam - oral or written
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	Predicts physicochemical and biological properties of organic compounds based on their chemical formulas. Uses the basic analytical techniques applied for the analysis of endogenous organic compounds Designs and performs simple biochemical experiments, using appropriate laboratory equipment.	[SU4] test/exam - oral or written
	[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	Characterizes basic analytical methods of endogenous, organic compounds. Characterizes methods of determination of enzymatic activity of selected proteases.	[SW4] test/exam - oral or written
	[CHEML3_K03] Establishes priorities in the right way for the implementation of tasks specified by herself/himself and/or by others.	Is aware of the need of critical analysis of own work. Is aware of the necessity of fair and reliable work.	[SK4] test/exam - oral or written
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	Uses chemical terminology necessary to present (both in oral and written form) the content presented in the course. Has the ability to predict the course and products of metabolic pathways .	[SU4] test/exam - oral or written
	[CHEML3_W01] Enumerates basic laws and theories in chemistry, physics, mathematics and biology.	Defines and demonstrates chemical structure of basic groups of bio- and macromolecules. Describes and illustrates main metabolic pathways using chemical reactions, explains their importance for the body functioning. Understands influence of diet on physical condition of the body.	[SW4] test/exam - oral or written
	[CHEML3_U09] Is able to learn independently.	Predicts 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, pentose phosphate pathway. Proteins G and signal transduction. Photosynthesis. DNA and RNA: replication, transcription, translation, PCR. Basics of genetic engineering.		
Prerequisites and co-requisites	Organic chemistry (bachelor level), fundamentals of organic chemistry, skills to work in a chemical laboratory, knowledge of basic laboratory glassware, learning the principles of work in a biochemical laboratory		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam - 5 open questions; 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 ¹⁴C, which of the carbon atoms in pyruvate would be labeled after glycolysis? Answer should be explain with chemical reactions 2. Describe the mechanism of the 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 experiment that would allow to isolate and identify them in pure form.		
Work placement	Not applicable		

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