

## Subject card

Subject name and code	Repetitory in organic chemistry and biochemistry, PG_00054869						
Field of study	Chemistry						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	postgraduate studies	Subject group			Obligatory subject group in the field of study		
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			English English		
Semester of study	1	ECTS credits			3.0		
Learning profile	academic	Assessment form					
Conducting unit	Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Krzysztof Rolka					
	Teachers	prof. dr hab. Krzysztof Rolka dr Aleksandra Walewska					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	30.0	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	<p>Familiarize students with the main aspects of organic chemistry and classes of organic compounds.</p> <p>Familiarize students with main aspects of stereochemistry of organic compounds.</p> <p>Familiarize students with types of organic reactions.</p> <p>Familiarize students with basic bioorganic compounds and their role in metabolic pathways.</p> <p>Familiarize students with importance and relationships of the metabolic pathways and their impact on living organism and natural environment.</p>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_U01] Plans and implements chemical experiments of medium complexity.	Students: present plainly – in both speech and writing – correct chemical argumentation; name and write structures and reactions of organic compounds, bio- and macromolecules, present and explain mechanisms of types of organic reactions, write chemical reactions of selected metabolic pathways	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[CHEMMU2_U04] Applies acquired knowledge of chemistry and related scientific disciplines.	Students: explain the relationships between metabolic pathways and their impact on the functioning of a living organism.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[CHEMMU2_U03] Finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry.	Students: use available scientific literature to prepare a paper presented during classes.	[SU1] oral statement/conversation/discussion
	[CHEMMU2_K05] Understands the need for independent search of information in scientific literature and popular science magazines.	Students: verify information available on websites.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK4] test/exam - oral or written
	[CHEMMU2_W04] Applies the acquired knowledge to an in-depth description of the properties of chemical connections, methods of their synthesis and analysis.	Students: characterize the relationships between basic groups of biomolecules and basic metabolic pathways and understand their impact on the living organism in relation to the socio-economic aspects of life.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report
	[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	Students: characterize physicochemical methods for examining the structures of biopolymers.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report
	[CHEMMU2_W02] Has extended and in-depth knowledge in the field of basic chemistry.	Students: define the structure and properties of organic compounds and bio- and macromolecules; understand the types of organic reactions, with particular emphasis on reaction mechanisms.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Studenti: rozumieją potrzebę uczenia się, inspirowania innych do nauki; współpracować w grupie, przyjmując różne role; wykazywać się kreatywnością w ustalaniu priorytetów niezbędnych do realizacji różnych zadań; Rozumieć społeczne aspekty praktycznego wykorzystania wiedzy i umiejętności oraz związaną z nimi odpowiedzialność	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK4] test/exam - oral or written	
Subject contents	Structure and properties of organic molecules (hybridization, resonance, isomerism, acidity). Types of organic reactions (substitution, elimination, addition, oxidation-reduction, radical reaction). Structure, synthesis and reactions of alkanes, alkenes, alkynes, alkyl halides, aromatic compounds, alcohols, phenols, ethers, epoxides, aldehydes and ketones, carboxylic acids and their derivatives, amines. Chemical structure, physicochemical properties and biological functions of peptides, proteins, nucleic acids, phospholipids, mono- and polysaccharides, energy-rich compounds, thermodynamics of biochemical reactions. Selected metabolic pathways: glycolysis, gluconeogenesis, pyruvate decarboxylation, Krebs cycle, oxidative phosphorylation, glycogen metabolism, fatty acids metabolism, amino acids metabolism.		
Prerequisites and co-requisites	Basic knowledge in organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Positive note from a written exam consisting of 10 open questions and an evaluation of the student's activity during classes	51.0%	100.0%

Recommended reading	Basic literature	L. G. Wade Jr., Organic chemistry,  J. McMurry Organic chemistry  J. M. Berg, J. L. Tymoczko, L. Stryer, Biochemistry,
	Supplementary literature	Various academic handbooks concerning organic chemistry and biochemistry
	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	<p>1. Draw the Lewis structure for each compound. Label the hybridization, geometry, and bond angles around each atom other than hydrogen. a) acetic acid b) 3-butene-2-one c) aniline d) dimethyl ether</p> <p>2. All of the following compounds can react as acids. Rank them in order of increasing acidity. Explain your ranking.</p> <p style="text-align: center;"><math>\text{CH}_3\text{CH}_2\text{OH}</math>, <math>\text{CH}_3\text{CH}_2\text{SO}_3\text{H}</math>, <math>\text{CH}_3\text{CH}_2\text{COOH}</math>, <math>\text{CH}_3\text{CHClCOOH}</math>, <math>\text{ClCH}_2\text{CH}_2\text{COOH}</math></p> <p>3. The reaction of 2-bromo-2-methylpropane heated in a mixture of methanol and <math>\text{H}_2\text{O}</math> gives three main products. Define the products and discuss the mechanisms leading to each of them.</p> <p>4. Define glycolysis and explain its role in the generation of metabolic energy.</p> <p>5. Describe the structures and biological roles of glycogen, starch, amylose, amylopectin and cellulose</p> <p>6. Outline the role of the dihedral angles of the polypeptide main chain in formation of protein secondary structure. List examples of canonical secondary structures.</p> <p>7. Explain why triacylglycerols are highly concentrated form of stored metabolic energy.</p> <p>8. Describe the structures and biological roles of DNA and RNA.</p>	
Work placement	Not applicable	

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