University of Gdańsk

Subject card

Subject name and code	Organic Chemistry with Elements of Biochemistry, PG_00199418						
Field of study	Nuclear safety and radiological protection						
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		
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		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Adam Prahl				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	30.0	0.0	0.0	90
	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	90		0.0		90.0	180
Subject objectives	To familiarize students with the structure, chemical properties and reactivity of basic groups of organic compounds and biomolecules.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BJORL3_W01] Has an advanced knowledge and understanding of the main concepts and principles of nuclear physics and chemistry, understands their historical development and significance not only for nuclear safety and radiation protection, but also in the context of the fundamental dilemmas facing modern civilization.	Has basic knowledge of the structure and properties of organic compounds and biomolecules and their participation in physical and chemical processes.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W03] Has advanced knowledge and understanding of the principles of planning and conducting simple physical and chemical experiments and analyzing obtained results; has knowledge and understanding of the fundamentals of measurement uncertainty as applied to experiments, the base SI units and the most important derived units, as well as other systems of units.	Knows the principles of planning basic chemical experiments. Is able to appropriately select and use basic equipment. Is able to critically assess the feasibility of performing experiments.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W02] Has an advanced understanding of the role of physical and chemical experiments, mathematical theoretical models approximating reality, and computer simulations in scientific research methodology; is aware of technological, apparatus, and methodological limitations in scientific research.	Knows the importance and can assess the possibility of using a physical and chemical experiment for planning and use in scientific research.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BJORL3_W05] Has advanced knowledge of the elementary components of matter and the types of fundamental interactions between them, the manifestations of these interactions in phenomena occurring at scales ranging from subatomic to subatomic, knows the time and energy scales associated with these phenomena.	Has basic knowledge of the structure of matter and the interactions related to the functioning of living matter.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work

Subject contents

What is organic chemistry? Atomic structure, atomic and molecular orbitals, hybridization, electronegativity, chemical bonds. Carbon atom against the background of the elements of the periodic table, bonds in organic chemistry (multiple). Theories of acids and bases, pH of aqueous solutions. Activation energy, transition state. Thermodynamics of a chemical reaction. Main sources of organic compounds: crude oil, coal, organic synthesis. Alkanes, methane, free radical substitution. Alkenes, structure and properties, carbocations, mechanisms of elimination, electrophilic and free radical addition. Spatial structure - stereochemistry, conformational analysis. Alkynes. Aromatic character - benzene, electrophilic substitution, directing effects of substituents. Organohalogen compounds, nucleophilic substitution, elimination. Alcohols and phenols, ethers, aldehydes, ketones, nucleophilic addition. Carboxylic acids and their derivatives. Amines. Amino acids, polypeptides and proteins. Carbohydrates. Nucleic acids and other natural compounds (alkaloids, fats, terpenes, dyes). Methods of analysis of organic compounds (classical and instrumental). Chemical structure, physicochemical properties and biological functions of: proteins, peptides, nucleic acids, lipids, phospholipids, mono- and polysaccharides. High-energy compounds. Structure and function of membranes and cell walls.

Prerequisites and co-requisites

Passed subject: General chemistry with elements of inorganic chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	51.0%	20.0%
written exam	51.0%	50.0%
	51.0%	30.0%

Recommended reading

Basic literature	Organic chemistry, R. T. Morrison, R. N. Boyd. Natural organic compounds, A. Kołodziejczyk, PWN, Warszawa, 2003. Basics of the preparation of organic chemical compounds, G. Kupryszewski, M. Sobocińska, R. Walczyna, WG, Gdańsk, 1998. Biochemistry, L. Stryer, PWN, Warszawa, 1997.
Supplementary literature	No requirements.
eResources addresses	

Example issues/ example questions/ tasks being completed

Structure and functions of proteins.
Properties of the carbonyl group.

Work placement

Not applicable

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