GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Organic and Bioorganic Chemistry, PG_00047868		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Optional subject group 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	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Ewa Wagner-Wysiecka	
	Teachers	dr hab. inż. Ewa Wagner-Wysiecka dr hab. inż. Anna Skwierawska dr inż. Radosław Pomećko	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	45.0	0.0	0.0	75

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	75	6.0	69.0	150

Subject objectives

The aim of the course is to establish a basic knowledge of organic chemistry and increase the knowledge of the chemistry of natural organic compounds. In particular attention will be paid to the structure, properties and reactivity of organic compounds, and the relationships between the chemical structure and biological role.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U51] can conduct laboratory work connected with chemistry and biochemistry, specific to biomedical engineering	The ability to analyze samples containing different classes of organic compounds and various groups of bioorganic compounds. Ability to use various laboratory techniques.	[SU4] Assessment of ability to use methods and tools
[K6_W52] Knows and understands, to an advanced extent, selected aspects of chemistry and biochemistry, constituting general knowledge related to the field of study	Knowledge of the chemical structure of basic organic and bioorganic compounds. Ability to link the structure of a compound with its properties.	[SW1] Assessment of factual knowledge

Subject contents	LECTURE Electronic structure of organic compounds. Molecular orbitals. Hybridisation of atomic orbitals. Delocalised orbitals. Isomerism. Types of isomerism. Major classes of organic compounds. Nomenclature of hydrocarbons. Nomenclature of organic compounds with functional groups Properties of acyclic hydrocarbons: saturated and unsaturated. Properties of aromatic compounds. Benzene. Polycyclic aromatic hydrocarbons. Identification of organic compounds by spectroscopic methods: NMR, IR, MS. Properties of major classes of organic compounds: alcohols, ethers, aldehydes, ketones, amines, carboxylic acids and their derivatives. Protein amino acids: structure, stereochemistry, optical activity, acid and base properties. Amino acid reactions. Peptide synthesis. Examples of biologically active peptides. Protein structure. Simple and complex lipids. Aldehyde alcohols and ketoalcohols. Glycerine aldehyde. Structure and stereochemistry of sugars. Major reactions of sugars. Oligo- and polysaccharides. Heterocyclic compounds. Nucleic acids: DNA structure and role Nucleic acids: RNA structure and role. Genetic code. Main stages of protein biosynthesis. Vitamins. Natural dyes. Enzymes. Features of enzymatic reactions. Chemical enzyme models. Guest-host chemistry. Macrocyclic compounds: synthetic enzyme and receptor analogues. LABORATORY Typical laboratory equipment and methods in organic chemistry. Methods for the purification of organic compounds. Essential qualitative analysis of organic compounds. Identification of organic compounds by spectroscopic methods. Preparation of organic compounds. Amino acids: identification reactions and quantitative determination. Proteins: detection, amphoteric properties, precipitation and denaturation. Lipids: physicochemical properties, preparation of fatty acids. Complex lipids: isolation of lecithins and cholesterol. Sugars: identification reactions. Physicochemical analysis of nucleic acids. Isolation of colour natural compounds (carotene, lycopene, chlorophyll) using chromatographic methods. Enzymes: oxidoreductases and hydrolases.
Prerequisites and co-requisites	Knowledge of the basics of chemistry and biochemistry
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical exercises	50.0%	50.0%
Written exam	50.0%	50.0%

Recommended reading	Basic literature	1. J. McMurry „Chemia organiczna” PWN 2005 2. P. Mastalerz „Chemia organiczna” Wyd. Chemiczne 2002 3. W. Gałasiński „Chemia medyczna” PZWL 2004 4. A. Kołodziejczyk „Naturalne związki organiczne” PWN 2013 5. B. Gierczyk, G. Schroeder „Fizykochemiczne podstawy życia” – materiały do ćwiczeń, UAM, Wydział Chemii, Poznań 2001 6. P. Kafarski, B. Lejczak „Chemia bioorganiczna” PWN 1994 7. R.K. Murray, D.K. Granner, V.W. Rodwell, red. wyd. pol. F. Kokot „Biochemia Harpera ilustrowana” PZWL 2008.
	Supplementary literature	1. T. Kędryna, M. Gałka-Walczak, B. Ostrowska „Wybrane zagadnienia z biochemii ogólnej z ćwiczeniami” Wyd. UJ 2001 2. S. Doonan „Białka i peptydy” PWN 2008 3. L. Kłyszejko-Stefanowicz „Ćwiczenia z biochemii” PWN 1980 4. P. Kafarski, P. Wieczorek „Ćwiczenia laboratoryjne z chemii bioorganicznej” Wyd. UO, Opole 1997.
	eResources addresses	Adresy na platformie eNauczanie: Chemia organiczna i bioorganiczna_2024_2025 - Moodle ID: 41424 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41424
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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