University of Gdańsk

Subject card

Subject name and code	Biological chemistry. Analysis of interactions between and intra-molecular biomolecules, PG_00196907		
Field of study	Biotechnology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	UG Institute of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Monika Górska-Arcisz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	8.0	10.0	0.0	0.0	0.0	18

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	18	5.0	27.0	50

Subject objectives

The course aims to impart principles of gathering and interpreting comprehensive information about a molecule based on its chemical structure. Students will learn to predict intermolecular and intramolecular interactions (attraction or repulsion) of biomolecules, understand chirality and conformational changes in molecules. They will become familiar with important chemical functional groups, their ionization abilities, and free radical formation, as well as applying this analysis to understand biological phenomena.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOTECHL3_W01] The graduate possesses structured and advanced knowledge of biological phenomena at the molecular level and understands their importance for biotechnology.	The student possesses the ability to predict interactions (attraction or repulsion) both within the molecule and with other chemical structures. The student understands the phenomena of chirality and conformational changes in a chemical molecule, and knows the most important chemical functional groups, their ability to ionize, and to form free radical systems.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[BIOTECHL3_W06] The graduate possesses structured and advanced knowledge of exact and natural sciences necessary to understand biological phenomena and processes, in particular cellular processes at the molecular level.	The student knows the principles of gathering and interpreting comprehensive information about a molecule of a chemical compound based on its chemical structure and other data, such as physicochemical properties.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task

<table>
<tr><td>Subject contents</td><td>Lectures:

- Determining the potential of molecular intermolecular and intramolecular interactions for selected chemical compounds.

- The concept of solving chemical problems in biology based on research on structure-activity relationships.

- Determination of the relative risk of toxicity and ecotoxicity of benzene towards toluene based on T-SAR.

- The potential of intra-molecular interactions present in the unfolded structure of DNA and chromatin.

- Analysis of the potential of interactions in higher structures of protein organization (secondary, tertiary, and quaternary).

Auditory exercises:

- Understanding the chemical structure of compounds.

- Ability for intra- and intermolecular interactions.

- Shape and plasticity of a chemical molecules.

- Molecular basis of chemical reactivity of molecules and their biological function.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Presentation</td><td>51.0%</td><td>15.0%</td></tr>
<tr><td>Written exam with open-ended and multiple-choice questions</td><td>51.0%</td><td>85.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Wstęp do chemii biologicznej dla studentów biotechnologii. B. Jastorff, R. Stoermann, W. Makarewicz, A.C. Składanowski, A. Borowiec, M. Markuszewski, Gdańsk 2004

2. Chemia medyczna, Patrick Graham, Wydawnictwo Naukowe PWN, 2019

3. Chemia medyczna - Podstawowe zagadnienia, Patrick Graham, Wydawnictwo WNT, 2003

4. Basic Concepts in Medicinal Chemistry, Marc Harrold, Robin Zavod, 2013</td></tr>
<tr><td>Supplementary literature</td><td>Chemia organiczna, część 1-5, John McMurry, Wydawnictwo Naukowe PWN, 2021</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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