GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Chemistry of bioelements, PG_00050105		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Anna Dołęga	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	1.0	9.0	25

Subject objectives

The aim of the course is to provide students with the knowledge about the specific properties of the elements that make up living organisms, i.e. bioelements, as well as the information how these specific properties are used by nature to carry out the vital functions of organisms.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W52] Knows and understands, to an advanced extent, selected aspects of chemistry and biochemistry, constituting general knowledge related to the field of study	The student knows the properties of bioelements that predestine these elements to play various roles in living organisms.	[SW1] Assessment of factual knowledge
[K6_U52] can determine properties of materials and biomaterials used in biomedical engineering	The student is able to describe the structure of basic types of biopolymers such as proteins or DNA and indicate how the properties of the elements forming them translate into the properties of macromolecules. The student can predict physical features based on the structure of the compound.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information

Subject contents

Bioelements in the periodic table.

Macronutrients - non-metals - carbon, hydrogen, oxygen, nitrogen, phosphorus, sulfur - the basic components of living organisms and biopolymers: proteins, DNA, sugars, lipids. Covalent bonds and weak intermolecular interactions.

Macronutrients - metals - calcium, sodium, potassium - the structural (building) role of calcium, regulation of osmotic and water-electrolyte balance by sodium and potassium cations, activation of enzymes and other biomolecules by magnesium ions. Ionic and coordination bonds.

Microelements - metals - the role of block d metal ions in enzymatic catalysis.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">General chemistry knowledge</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Rosette M. Roat‑Malone Bioinorganic Chemistry. A Short Course. Wiley 2003</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Ei-Ichiro Ochiai Bioinorganic Chemistry 2008</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Explain why amino acids dissolve best in water.

2. How do potassium channels distinguish sodium and potassium ions?

3. Why do SOD enzymes use Cu, Mn, Fe instead of using Ca or Mg ions in the active site?</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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