



## Subject card

Subject name and code	Chemistry of bioelements, PG_00050105						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
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_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.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[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		
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.						

Prerequisites and co-requisites	General chemistry knowledge		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	50.0%	100.0%
Recommended reading	Basic literature	Rosette M. Roat Malone Bioinorganic Chemistry. A Short Course. Wiley 2003	
	Supplementary literature	<b>Ei-Ichiro Ochiai Bioinorganic Chemistry 2008</b>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>1. Explain why amino acids dissolve best in water.</p> <p>2. How do potassium channels distinguish sodium and potassium ions?</p> <p>3. Why do SOD enzymes use Cu, Mn, Fe instead of using Ca or Mg ions in the active site?</p>		
Work placement	Not applicable		