GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of bionanotechnology, PG_00052073		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
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	dr hab. inż. Agnieszka Pladzyk	
	Teachers	dr hab. inż. Agnieszka Pladzyk	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

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	30	2.0	18.0	50

Subject objectives

The purpose of this course is to introduce Students to the field of using evolutionarily optimized biological systems, such as cells, cellular components, nucleic acids, and proteins, to produce functional nanostructured and mesoscopic architectures composed of organic and inorganic materials, with applications in various areas of everyday life.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W07	The student identifies the phenomena occurring at the molecular level in the cell, he/she also learns about the approaches in the design of bionanoparticles and bionano-objects with different target applications, and has knowledge about the methods of their identification	[SW1] Assessment of factual knowledge
K6_U01	Students can describe basic bionanostructures, their structure, functions and physico-chemical properties; Student is able to give examples of application of bionanotechnology in different areas of everyday life.	[SU3] Assessment of ability to use knowledge gained from the subject
K6_W05	Student knows fundamentals of bionanotechnology, also has the knowledge about basic research methods which allow for the identification of biomolecules	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>1. Structure of DNA as a carrier of genetic information
2. RNA- structure, functions and types
3. Cell organelles
4. Bacteria unicellular organisms
5. Viruses Cell-free forms of matter
6. Antibodies origin, types and role
7. Proteins, lipids, carbohydrates - their application in bionanotechnology
8. Proteins as natural bionanomaschines
9. Molecular devices (myosin-actin, catenanes, rotaxanes)
10. Biomolecules immobilization
11. Polymeric bionanomaterials as carriers</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>The student has basic knowledge of chemistry and physics</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>10 lecture tests</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Podstawy biologii komórki, Bruce Alberts i inni, Wydawnictwo Naukowe PWN, Warszawa, 3, 2019
2. Mikrobiologia Ogólna, Schlegel Hans G, Wydawnictwo Naukowe PWN, Warszawa, 2, 2008
3. Biochemia, Lubert Stryer, Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Wydawnictwo PWN, 2019
4. Chemia ogólna, Peter Atkins, Loretta Jones, Laverman Leroy, Wydawnictwo PWN, 2020</td></tr><tr><td>Supplementary literature</td><td>Scientific publications</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
2024_2025_Podstawy_bionanotechnologii - Moodle ID: 44643
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44643</td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Describe the structure of an antibody
2. List the types and function of RNA
3. List the differences between the structure of a eukaryotic cell and a prokaryotic cell
4. What is the difference between a virus and a bacterium
5. Methods of eliminating microorganisms
6. List and describe three selected bioparticles
7. What is biomimetics?
8. What is bionanotechnology?
9. Give four physicochemical factors that determine the use of enzymes in catalytic reactions.
10. What are nano-biomaterials?</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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