GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069410		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marta Prześniak-Welenc	
	Teachers	dr inż. Marta Prześniak-Welenc	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	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 aim of the course is to deepen students knowledge of advanced synthesis methods of bionanomaterials and to develop practical skills in their characterization using physicochemical and biological techniques. Students acquire competencies in selecting synthesis methods tailored to application requirements, performing structural, morphological, and surface analyses, and critically interpreting the results in terms of biocompatibility and potential applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W07	Has systematic and advanced knowledge of the physical and chemical foundations of nanotechnology, including state-of-the-art synthesis methods of bionanomaterials, their classification, structural, physicochemical, and biological properties, as well as modern characterization techniques, enabling informed experimental design and interpretation of research results.	[SW2] Assessment of knowledge contained in presentation
K6_U06	Can clearly and accurately present issues related to the synthesis, characterization, and applications of bionanomaterials to specialists from related fields (chemistry, biology, materials engineering, medicine), as well as to initiate and coordinate interdisciplinary collaboration aimed at solving research and implementation challenges.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Lecture:
Advanced methods for the synthesis of bionanomaterials.
Design of bionanomaterials for specific applications.
Characterization techniques for bionanomaterials.
Interpretation and correlation of research results.

Laboratory:
Synthesis of gold nanoparticles with controlled morphology.
Characterization of the obtained materials.</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>Laboratory - report</td><td>100.0%</td><td>40.0%</td></tr>
<tr><td>Lecture - presentation</td><td>50.0%</td><td>60.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Inżynieria Biomedyczna Podstawy i Zastosowania, Biomateriały, Tom 4, red S. Błażewicz, J. Marciniak, Exit, Warszawa 2013
2. Nanotechnologie, red Robert W. Kelsall, PWN, Warszawa 2009
3. Nanomateriału inżynierskie, konstrukcyjne i funkcjonalne, red. K. Kurzydłowski, M. Lewandowska, PWN 2009</td></tr>
<tr><td>Supplementary literature</td><td>Articles from JCR list</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Discuss the difference between emulsification combined with solvent diffusion and nanoprecipitation.
2. List and discuss the types of carbon nanotubes.
3. Explain the principle of carbon nanotube functionalization.
4. List the types of stabilizing agents used in the chemical reduction method.
5. Describe the stages of chemical reduction and explain how the size of the obtained nanoparticles can be controlled.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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