GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058945		
Field of study	Nanotechnology		
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	3.0
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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Natalia Wójcik	
	Teachers	dr hab. inż. Natalia Wójcik	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 1166 Biomateriały i nanobiomateriały z podstawami anatomii
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1166

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	45	5.0	25.0	75

Subject objectives

Theoretical and practical understanding of the importance of biomaterials and bionanocomposites in medicine/tissue engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K05	Can create a presentation to show the results of their work.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice
K6_U02	Is able to design and produce biomaterials and characterize them.	[SU2] Assessment of ability to analyse information
K6_W07	Has basic knowledge of human anatomy and biomaterials.	[SW1] Assessment of factual knowledge

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

1. Biomaterials: Definition Glossary and Historical Aspects. 2. Basic Anatomy. Soft and Hard Tissue Glossary. 3. Classification of Biomaterials. Implants. 4. The Path of a Biomaterial from Concept to Implementation. 5. Research Techniques: In Vitro Research: Definition, Purpose, and Description. Division into Static and Dynamic Studies, Comparison of Various Biological Environments, Applications (What Information Do They Provide). 6. In Vivo Research What They Involve and What Requirements They Have. Examples of Studies, and Required Consents for Research on Living Organisms. 7. Degradation and Corrosion of Biomaterials in a Biological Environment. 8. Types of Biomaterials: Bioglasses, Bioceramics, Bone Cements, Composites Compositions, Properties, Manufacturing Techniques, Modifications, Current Applications. 9.Nanobiomaterials and nanocomposites 10.Biomaterials as drug carriers, biomaterials of natural origin.

Laboratory:
Synthesis of a biomaterial currently used in medicine (bioglass, bioceramics, bone cement). Design of in vitro studies in artificial body fluid. Conducting designed tests for short and long immersion periods and drawing conclusions based on basic studies: pH changes, mass changes, topography observations, and structural studies.</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</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Lecture</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
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<tr><td>Basic literature</td><td>Fundamentals of Biomaterials, Vasif Hasirci, Nesrin Hasirci, https://doi.org/10.1007/978-3-031-54046-2, Springer Cham

Articles and magazines concerning biomaterials</td></tr>
<tr><td>Supplementary literature</td><td>-</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>Soft and hard tissue: how it is structured.
In vitro and in vivo studies: what they involve and what information they provide.
How does biomaterial degradation occur and under what conditions?
Implant materials: what requirements are placed on them.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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