GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00073754		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Biomaterials Technology -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Joanna Sypniewska	
	Teachers		

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	5.0	15.0	50

Subject objectives

The aim of the course is to prepare students to select and evaluate surface modification methods for biomaterials, independently conduct experiments, and analyze and interpret experimental results, using knowledge of surface modification mechanisms and technologies to formulate and test research hypotheses concerning the properties of biomaterials intended for medical applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study	Is able to evaluate the suitability and applicability of selected biomaterial surface modification techniques by comparing their capabilities, limitations, and effects on material properties for a specific medical application.	[SU4] Assessment of ability to use methods and tools
[K7_U02] formulates hypotheses to test research problems in the field of medical engineering	Is able to formulate testable research hypotheses concerning the effects of surface modification on biomaterial properties by analyzing research problems and selecting appropriate experimental methods for hypothesis testing.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K7_W03] has structured and well-founded knowledge covering issues in the field of medical engineering allowing to design medical devices, rehabilitation systems and to formulate research procedures	Knows and understands the principles, mechanisms, and methods of biomaterial surface modification and their effects on surface properties in the context of designing biomaterials for medical applications and developing research procedures.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Planowanie eksperymentów i formułowanie hipotez badawczych dotyczących modyfikacji powierzchni biomateriałów. Samodzielne przygotowanie próbek i wykonywanie wybranych procesów modyfikacji powierzchni pod nadzorem prowadzącego. Analiza i interpretacja wyników badań, ocena skuteczności zastosowanych metod oraz ich przydatności do zastosowań medycznych. Opracowanie dokumentacji eksperymentalnej i formułowanie wniosków badawczych.

Course content – laboratory

Planning experiments and formulating research hypotheses concerning biomaterial surface modification. Independently preparing samples and performing selected surface modification processes under instructor supervision. Analyzing and interpreting experimental results, evaluating the effectiveness of the applied methods and their suitability for medical applications. Preparing experimental documentation and drawing research conclusions.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of materials science, biomaterials, and surface physicochemistry, as well as the ability to interpret the results of materials testing.</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></td><td>0.0%</td><td>0.0%</td></tr>
<tr><td>presentation</td><td>60.0%</td><td>100.0%</td></tr>
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<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>napisz mi tak po ang: Metody badań biomateriałów i tkanek – wstęp do ćwiczeń laboratoryjnych - Aneta Liber-Kneć, Sylwia Łagan
Biomateriały - Stanisław Błażewicz,Leszek Stoch</td></tr>
<tr><td>Supplementary literature</td><td></td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>What are the main methods of biomaterial surface modification, and how do their mechanisms differ? How can an appropriate surface modification method be selected for a specific medical application? How do modification process parameters affect the surface properties of biomaterials? What research hypotheses were formulated when planning the experiment, and how can they be tested? How should the results obtained before and after surface modification be interpreted? What conclusions regarding the effectiveness of the applied method can be drawn from the experimental results?</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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