GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00073756		
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 apply methods for testing biomaterial properties and to analyze and interpret the results, using knowledge of material properties and testing techniques in the context of assessing the suitability of biomaterials for medical applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	Is able to evaluate and select methods for testing biomaterial properties by analyzing their capabilities, limitations, and measurement requirements to solve a specific research problem.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K7_U01] uses acquired analytical, simulation and experimental methods as well as mathematical models to solve engineering problems in the field of medical engineering	Is able to investigate selected biomaterial properties and analyze the results using experimental and analytical methods to solve research problems in medical engineering.	[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 and applications of methods for testing the physical, mechanical, and surface properties of biomaterials in the context of developing research procedures and evaluating materials for medical applications.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Fundamentals of biomaterial characterization and the importance of property evaluation in medical applications. Methods for testing the physical, mechanical, and surface properties of materials. Principles of sample preparation, measurement procedures, and result interpretation. Criteria for selecting testing methods, their capabilities, limitations, and sources of measurement uncertainty.

Course content – laboratory

Preparation of biomaterial samples for testing and measurement of selected material properties. Operation of available testing equipment in accordance with laboratory procedures. Processing, analysis, and interpretation of measurement results and assessment of their reliability. Comparison of testing methods and preparation of laboratory documentation.

Prerequisites and co-requisites

Basic knowledge of materials science, biomaterials, and measurement methods, as well as the ability to perform basic calculations and interpret material testing results.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>laboratory report</td><td>60.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Ratner B. D., Hoffman A. S., Schoen F. J., Lemons J. E. (red.), Biomaterials Science: An Introduction to Materials in Medicine, 4th ed., Academic Press, 2020.

Błażewicz S., Stoch L. (red.), Biomateriały, Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2003.

Callister W. D., Rethwisch D. G., Materials Science and Engineering: An Introduction, 10th ed., Wiley, 2018.</td></tr>
<tr><td>Supplementary literature</td><td>Park J. B., Lakes R. S., Biomaterials: An Introduction, 3rd ed., Springer, 2007.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Which methods are used to test the mechanical, physical, and surface properties of biomaterials? How can an appropriate measurement method be selected for a specific material and research objective?</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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