GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056086		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
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	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Jażdżewska	
	Teachers	dr inż. Magdalena Jażdżewska dr inż. Michał Bartmański dr inż. Beata Majkowska-Marzec dr inż. Gabriel Strugała	

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						

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	0.0	0.0	45

Subject objectives	The aim of the course is to acquire knowledge about techniques, procedures, devices and research equipment, as well as the ability to perform microstructure tests, mechanical, physical, chemical, physicochemical and biological properties of metal, ceramic, polymer, composite and biolayers as well as biocoatings.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W04] he/she has skills in the field mechanical testing of materials used in engineering and mechanical-medical area	The student has knowledge of the existing biomaterials and research methods adapted to the requirements that should be met by a given medical device, especially an implant; has knowledge of biomaterials and implants testing methods and is able to perform tests specified in standards or principles of good practice.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	[K6_W13] he/she has knowledge related to application of engineering approaches in medicine or application of medical devices and rehabilitation devices	Student is able to characterize and perform tests of mechanical properties of biomaterials, including tensile, compression, bending, torsion, fatigue, hardness and nanoindentation tests, as well as to assess whether their values are sufficient to produce a specific medical choice, especially an implant.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	[K6_U09] he/she is able to select proper constructive materials to design the device	A student is able to select biomaterials for a medical device, especially an implant, taking into account its conditions of use.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
	[K6_U07] he/she is able to identify the problem and list simple engineering tasks to solve this problem in practice, he/she is able to critically analyze the proposed technical solutions and conclude whether these solutions can be implemented to solve problems related to design of mechanical devices and mechanical-medical devices	The student is able to develop design assumptions for any medical device, especially an implant; assess the state of knowledge in this area on the basis of literature, clinical practice and patent databases; characterize the advantages and disadvantages of existing design solutions and the directions of research.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
Subject contents	Characteristics and types of material tests. Mechanical properties tests: tensile, compression, bending, torsion, fatigue, nanoindentation tests. Physical properties tests: diffraction, magnetic and electromagnetic tests. Research on chemical properties; corrosion tests of various types. Characteristics and methods of testing metal biomaterials. Characteristics and methods of testing ceramic biomaterials. Characteristics and methods of testing polymer and carbon biomaterials. Characteristics and methods of testing composite biomaterials. Characteristics and methods of testing biolayers and biocoatings		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment of laboratory skills	50.0%	50.0%
	Exam for lectures	50.0%	50.0%
Recommended reading	Basic literature	Świeczko-Żurek B.:Biomateriały. Wyd. Polit. Gdańskiej, Gdańsk 2009. Świeczko-Żurek B., Zieliński A., Sobieszczyk S., Ossowska A., Seramak T.:Biomateriały. Wyd. Polit. Gdańskiej, Gdańsk 2011. Marciniak J.: Biomateriały. Biomateriały. Exit, Katowice 2013. Liber-Kneć A., Łagan S.: Ćwiczenia laboratoryjne z biomateriałów. Wyd. Polit. Krakowskiej, Kraków 2011.	
	Supplementary literature	https://docplayer.pl/37216554-Metody-badan-biomaterialow.html Biocybernetyka i inżynieria biomedyczna. St. Błażewicz, J. Marciniak (red.). Tom 4: Biomateriały. Exit, Katowice 2000. Wang M., Wang C.: Bulk Properties of Biomaterials and Testing Methods. https://www.researchgate.net/publication/324733462_Bulk_Properties_of_Biomaterials_and_Testing_Methods	

	eResources addresses	Adresy na platformie eNauczanie: Metody badań biomateriałów, W, L, IMM, sem. 05, Ist., se. zimowy 2023/24 - Moodle ID: 33800 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33800
Example issues/ example questions/ tasks being completed	1. Test methods for the mechanical properties of bioceramics. 2. Test methods for corrosion resistance of metal biomaterials. 3. Test methods for the wettability of biomaterials.	
Work placement	Not applicable	

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