



Subject card

Subject name and code	, PG_00056087						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
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. Beata Majkowska-Marzec				
	Teachers						
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 obtain knowledge in the field of degradation of materials and products, in particular biomedical materials and implants. The second goal is to acquire skills in the evaluation of the degradation mechanism of the biomaterial or implant, the causes of degradation, and the evaluation of the biomaterial's susceptibility to degradation.						
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 types of biomaterials, implants made of them, environmental exposures, methods of research on degradation processes.		[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[K6_W13] he/she has knowledge related to application of engineering approaches in medicine or application of medical devices and rehabilitation devices		The student is able to indicate factors and mechanical properties determining the lifetime of implants.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_U09] he/she is able to select proper constructive materials to design the device		The student has skills in the proper selection of biomaterials for implants in terms of their minimum degradation and maximum service life.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	[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 identify the degradation mechanism, determine its possible causes and determinants of the process, and propose countermeasures.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
Subject contents	The concept of the material degradation process. The specificity of the degradation of materials in the biological environment of the organism. Electrochemical, mechanical, mechanical-chemical degradation of metal biomaterials and coatings; typical cases; test methods; ways of prevention in the design and monitoring phase. Mechanical degradation of ceramic biomaterials; typical cases; test methods; ways of prevention in the design and monitoring phase. Mechanical and chemical degradation of biopolymers; typical cases; test methods; ways of prevention in the design and monitoring phase.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Writing exam	50.0%	50.0%
	Laboratory exercises	50.0%	50.0%
Recommended reading	Basic literature	B. Świeczko-Żurek: Biomateriały. Polit. Gdańska, Gdańsk 2009. Pomorska Biblioteka Cyfrowa. J. Marciniak: Biomateriały. Wyd. Pol. Śląskiej, Katowice 2013. J. Baszkiewicz, M. Kamiński: Korozja materiałów. OWPW, Warszawa 2006.	
	Supplementary literature	N.L. Davison, F. Barrere-de Groot, D.W. Grijpma: Degradation of Biomaterials. [In] Tissue Engineering, 6th Chapter, 2014, pp., 177-215. D. Das, Z. Zhang i in.: Bioresorption and Degradation of Biomaterials. [In] Tissue Engineering III: Cell - Surface Interactions for Tissue Culture. C. Kasper, E. Witte, R. Partner (red.), Springer Verlag, Berlin - Heidelberg 2012. Adv. Biochem. Eng. Biotechn. 126 (2012) 317-333. C:\Users\Dell\AppData\Local\Temp\2012_Book_TissueEngineeringIII\Cell-Surfa.pdf.	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	1. What is perimplantitis and how does it affect the degradation of titanium implants?2. What requirements should the biomaterials for a knee joint implant meet in terms of their degradation?3. What methods are used to assess the durability of implant coatings?	
Work placement	Not applicable		

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