

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00065671								
Field of study	Mechanical and Medical Engineering								
Date of commencement of studies	February 2024		Academic year of realisation of subject			2024/2025			
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			5.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład Technologii Biomateriałów -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology								
Name and surname	Subject supervisor		dr inż. Marcin Wekwejt						
of lecturer (lecturers)	Teachers								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM	
of instruction	Number of study hours	0.0	0.0	60.0	0.0		0.0	60	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation ir classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study hours	60		10.0		55.0		125	
Subject objectives	The objective of the course is to provide knowledge and skills essential for the production and characterization of medical cements. Student will become familiar with modern techniques for preparing cements, assessing their physicochemical properties, and testing their biocompatibility. The main topics will focus on understanding the processes of synthesis and modification of cements designed for medical applications.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K7_W07] He/she in-depth knowledge related to engineering materials and technologies used in mechanical-medical engineering		The student possesses theoretical knowledge about the properties of medical cements and their impact on tissues.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
	[K7_W03] He/she knows methods, techniques and tools applied to solve engineering problems in the scope of the field of study of mechanical-medical engineering		The student is able to apply methods for the production and characterization of medical cements.			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_W05] He/she has in-depth knowledge related to the methods and techniques used in medicine		The student understands the applications of medical cements in clinical practice.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
Subject contents	The course focuses on the practical understanding of technology and the characterization of selected properties of medical cements, as well as their applications in surgery and orthopedics. Student will acquire knowledge and practical skills in the following areas: (1) Introduction to medical cements, (2) Techniques for producing ceramic cements, (3) Techniques for producing polymer cements, (4) Physicochemical characterization of medical cements, (5) Biocompatibility testing of cements, (6) Methods for evaluating the mechanical properties of cements, (7) Processes for modifying medical cements, (8) Practical applications of cements in surgery and orthopedics.								
Prerequisites and co-requisites									
Assessment methods	Subject passin	Subject passing criteria		Passing threshold			Percentage of the final grade		
and criteria	Final Project	60.0%			100.0%				

Recommended reading	Basic literature	 Kuehn, KD. Bone Cements: Up-to-Date Comparison of Physical and Chemical Properties of Commercial Materials. Springer, 2000. Wilson, A. D., Nicholson, J. W., & Prosser, H. J. Dental Cements: Chemistry, Properties, and Applications. Springer, 1998. Dorozhkin, S. V. Calcium Orthophosphates: Applications in Nature, Biology, and Medicine. Pan Stanford Publishing, 2012. 				
	Supplementary literature	 Bohner, M., & Lemaitre, J. Calcium Phosphates in Biomedical Applications: From Ceramics to Cements. Springer, 2019. Hench, L. L., & Jones, J. R. Biomaterials, Artificial Organs and Tissue Engineering. Woodhead Publishing, 2005. Kutz, M. (Ed.). Standard Handbook of Biomedical Engineering and Design. McGraw-Hill, 2003. 				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	 What types of medical cements are used in mechanical-medical engineering, and what are their key properties? Develop a report on research into phosphate cements using appropriate computational tools. What are the methods of producing medical cements, and what parameters influence their properties? Conduct an experimental project to investigate the impact of manufacturing parameters on cement properties. What biocompatibility assessment techniques are used in medical cement research? Prepare a presentation on cement research results and discuss their potential applications in orthopedics. 					
Work placement	Not applicable					

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