



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 of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Wekwejt				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	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 in didactic classes included in study plan	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 and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Final Project		60.0%		100.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Kuehn, K.-D. Bone Cements: Up-to-Date Comparison of Physical and Chemical Properties of Commercial Materials. Springer, 2000. 2. Wilson, A. D., Nicholson, J. W., & Prosser, H. J. Dental Cements: Chemistry, Properties, and Applications. Springer, 1998. 3. Dorozhkin, S. V. Calcium Orthophosphates: Applications in Nature, Biology, and Medicine. Pan Stanford Publishing, 2012.
	Supplementary literature	<ol style="list-style-type: none"> 1. Bohner, M., & Lemaitre, J. Calcium Phosphates in Biomedical Applications: From Ceramics to Cements. Springer, 2019. 2. Hench, L. L., & Jones, J. R. Biomaterials, Artificial Organs and Tissue Engineering. Woodhead Publishing, 2005. 3. 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	<ul style="list-style-type: none"> - 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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