GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056101						
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	6		ECTS credits	2.0			
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	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		0.0		0.0	30
Subject objectives	The aim of the course is to obtain by students basic knowledge and skills related to the technology of producing metal, ceramic, polymer and composite biomaterials, methods of producing implants for various applications, process control and research methods.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] he/she is able to design, manufacture and utilize machine parts and technical devices, he/she can prepare a technical documentation	The student has the necessary knowledge about the design of technology for the production of biomaterials and implants, technological diagrams, technical documentation.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[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 knows how to assess the production technologies existing in the field of biomaterials and implants, their advantages and disadvantages, methods of control and research.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K6_K01] he/she knows his/her proficiencies and his/her limitations in performing professional tasks, he/she is aware of needing to improve his/her skills through the whole life, he/she has entrepreneurship and innovation skills, he/she is aware of engineering skills from the society point of view	The student is able to explore the professional literature on the technology of producing biomaterials and implants, determine the degree of innovation of the proposed methods and purposeful progress in these areas.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness
[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 the basic techniques of producing biomaterials and implants, including subtractive and additive methods.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_W04] he/she has skills in the field mechanical testing of materials used in engineering and mechanical-medical area	Student is able to characterize the main technologies of producing biomaterials and implants, justify them, provide the necessary methods of control and development research.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents

Technologies for the production of metallic biomaterials and implants: molding, additive methods, subtraction methods, post-treatment, process control, research methods. Technologies for the production of ceramic biomaterials and implants: powder metallurgy, additive methods, chemical methods, process control, research methods. Technologies for the production of polymer biomaterials and implants: additive methods, subtractive methods, electrospinning, process control, research methods. Technologies for the production of composite biomaterials and implants: additive methods, process control, research methods.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written examination	50.0%	50.0%
Laboratory exercices	50.0%	50.0%

Recommended reading

Basic literature

B. Świeczko-Żurek, A. Zieliński, A. Ossowska, S. Sobieszczyk: Biomateriały. Wyd. Politechniki Gdańskiej, Gdańsk, 2011.

A. Zieliński, W. Serbiński, T. Seramak, A. Ossowska, B. Świeczko-Żurek: Innowacyjne technologie kształtowania właściwości materiałów konstrukcyjnych i biomedycznych. Wyd. Politechniki Gdańskiej, Gdańsk, 2018.

J. Marciniak, M. Błażewicz, W. Torbicz: Biomateriały. [W} Inżynieria biomedyczna. Podstawy i zastosowania. Tom 4. Akad. Ofic. Wydawn. Exit, Katowice, 2016.

	Supplementary literature	M. Bartmański, A. Hernik, M. Jażdżewska, B. Majkowska-Marzec, A. Ossowska, B. Świeczko-Żurek, B. Trybuś, J. Wosek, K. Zasińska, A. Zieliński: Nanotechnologia w medycynie i kosmetologii. Wyd. Politechniki Gdańskiej, Gdańsk, 2018. H. Singh. S. Singh, C. Prakash: Current Trends in Biomaterials and Bio-manufacturing. [W] Biomanofacturing, Chapter 1, pp. 1-39. https://www.researchgate.net/publication/331161230_Current_Trends_in_Biomaterials_and_Bio-manufacturing.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. What is the production of implants by 3D printing and what are its varieties for polymers (example)? 2. How are ceramic dental implants made? 3. What is the intraoral scanner used for in prosthetics and how does it affect the accuracy of prosthetic components in dentistry?	
Work placement	Not applicable	

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