



## Subject card

Subject name and code	, PG_00053508						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
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		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Natalia Łukasik				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		10.0		60.0	100
Subject objectives	The aim of this course is to present students materials used in biomedical engineering, the materials properties and way of their manufacturing.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U52] can determine properties of materials and biomaterials used in biomedical engineering		The student is able to list the main types of materials used in biomedical engineering, describes the properties of individual groups of materials		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W53] Knows and understands, to an advanced extent, selected aspects of materials science and biomaterials constituting general knowledge related to the field of study		The student knows the main biocompatible materials used in ophthalmology, dentistry, orthopedics, aesthetic medicine, cardiac surgery, etc. Is able to characterize these materials and propose the choice of material depending on the function.		[SW1] Assessment of factual knowledge		
	[K6_U51] can conduct laboratory work connected with chemistry and biochemistry, specific to biomedical engineering		The student has practical skills to conduct experiments in chemistry and biochemistry, specific to biomedical engineering		[SU4] Assessment of ability to use methods and tools		
Subject contents	LECTURE: General characteristics of biocompatible materials, methods of sterilization of materials, biocompatible materials for the regeneration of visual and hearing defects, biocompatible materials used in dentistry, biocompatible materials used in orthopedics, materials for tissues regeneration, materials for skin regeneration, materials used in cardiac surgery, tissue engineering, materials used in aesthetic medicine, radiological contrasts, electronic devices to improve the functioning of the body, drug carriers, artificial ion channels, surface modification of biocompatible materials. Trip - Dental Lab company, Gdańsk. LABORATORY 1. Information on working methods in the laboratory, health and safety, schedule of exercises and division into groups of 2-3 persons. 2. Determination of critical micellization concentration, extraction, drug carriers, hydrogels, glucose sensor, glass corrosion, surface lipophilization, quantum dots, additional classes to repeat experiments. Trip – Medical University of Gdańsk.						
Prerequisites and co-requisites	Student knows basic terms as: stability of organic and inorganic compounds, mechanical and chemical properties, stability in physiological environment, irradiation resistance, structure of biological materials, denaturation, enzymatic activity.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	participation in all laboratory classes, correct performance of experiments and obtaining positive grades on all tests	60.0%	30.0%
	passing of oral exam on the issues discussed during the lecture and the laboratory	60.0%	70.0%
Recommended reading	Basic literature	1. Biocybernetyka i inżynieria biomedyczna 2000. Tom 3. „Sztuczne narządy” i „Materiały biozgodne” pod red. M. Nałęcza. Akademicka Oficyna Wydawnicza EXIT, Warszawa 2001.  2. Farmacja stosowana, S. Janicki, A. Fiebig, M. Sznitowska, Warszawa, PZWL 2006  3. Postępy technologii biomedycznych, pod red. Zbigniewa Nawrata, Zabrze 2008. ISBN-978-83-88427-77-0; www.robinheart.pl  4. K. Żelechowska. Materiały biozgodne i specjalnego przeznaczenia. Wydawnictwo Politechniki Gdańskiej, 2014. ISBN 978-83-7348-546-4	
	Supplementary literature	1. Biomateriały w stomatologii, J. Marciniak, M. Kaczmarek, A. Ziębowicz, Wydawnictwo Politechniki Śląskiej, 2008 2. Leksykon materiałoznawstwa na CD, pod red. L.A. Dobrzańskiego, Format CD-R, ISBN: 978-83-910914-1-8	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed		
Work placement	Not applicable		

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