



## Subject card

Subject name and code	Biomaterials, PG_00053714						
Field of study	Mechanical 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		English		
Semester of study	6		ECTS credits		1.0		
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. Łukasz Pawłowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15		0.0		0.0	15
Subject objectives	The aim of the course is to acquire basic knowledge of biomedical materials, including metal, polymer, ceramic and composite materials. Acquiring the ability to modify the surface of implants and the assessment of their selected properties.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W12		Student potrafi posługiwać się bazami patentowymi oraz zna normy i badania związane z wprowadzeniem na rynek nowego materiału biomedycznego.		[SW3] Assessment of knowledge contained in written work and projects		
	K6_U10		The student is able to choose the material for the implant depending on its purpose.		[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject		
	K6_W03		The student is able to test selected properties of the biomedical material (e.g. wettability).		[SW3] Assessment of knowledge contained in written work and projects		
	K6_U01		The student is able to use the database literature resources in order to find the necessary information.		[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information		
Subject contents	1. Literature databases, patent databases and standards related to biomedical materials.2. Characteristics, structure and application of titanium and its alloys used as biomaterials.3. Influence of surface treatment on the corrosion resistance of metal materials for implants for bone surgery.4. Selection of materials for implants.5. Technologies for producing hydroxyapatite coatings by electrophoretic method.						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	56.0%	100.0%
Recommended reading	Basic literature	1. M. Kutz, Biomaterials Engineering and Design Handbook, McGraw-Hill 2009 2. I. Corni , M.P. Ryan, A.R. Boccaccini , Electrophoretic deposition : From traditional ceramics to nanotechnology , Journal of the European Ceramic Society . 28 (2008) 1353 1367. 3. Rosario Pignatello, Biomaterials Science and Engineering, InTech, Croatia, 2011.	
	Supplementary literature	1. B.D. Ratner, A.S. Hoffman, F.J. Schoen, J.E. Lemons, Biomaterials Science, Academic Press, San Diego, 1996 2. Q. Chen, G.A. Thouas, Metallic implant biomaterials, Materials Science and Engineering R: Reports. 87 (2015) 157	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Definition of biomaterial, implant, layer, coating, surface modification. 2. Classification of materials intended for implants. 3. Characteristics of materials intended for short-term implants. 4. Characteristics of materials intended for long-term implants. 5. Standards and tests of materials intended for implants.		
Work placement	Not applicable		