



## Subject card

Subject name and code	Biomaterials for Medical and Mechanical Engineering, PG_00039315						
Field of study	Medical and Mechanical Engineering, Medical and Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2021/2022	
Education level	first-cycle studies	Subject group				Obligatory subject group in the field of study 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	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Beata Świczko-Żurek				
	Teachers		dr hab. inż. Beata Świczko-Żurek				
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		5.0		40.0	75
Subject objectives	Main aims of the course include: gaining by the student of fundamental knowledge about biomaterials, including metallic, polymer, ceramic and composite materials, and about their fabrication, surface modification, and applications for implants; development of skills for assessment, selection and fabrication of biomaterials.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K02		Ability to cooperate in a team		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness		
	K6_W04		He can use his knowledge of materials in the field of medical engineering.		[SW3] Assessment of knowledge contained in written work and projects		
	K6_U09		The ability to think independently		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	Lectures: Classification of medical materials. Materials for binding the tissues. Dressing materials. Materials for surgery tools. Pasivation methods of biomaterials' surface. Sterilization and disinfection. Structural materials for orthopaedy. Materials for prosthetics. Materials for orthotics. Orthopaedic fillers. Cosmetic prostheses. Rehabilitation equipment - construction and supplementary materials. Physical and chemical investigation techniques of biomaterials. Chemical and biological investigation techniques of biomaterials. Directions of development of biomaterials. Laboratory exercises: Characteristics of laboratory work as technique for widening of knowledge and skills in area of biomaterials science. Characteristics, structure and application of austenitic steels used as biomaterials. Characteristics, structure and application of titanium alloys used as biomaterials. Influence of surface treatment on corrosion resistance of metallic materials used for implants in bone surgery. Selection of steel grade and complex of mechanical properties for some specified surgery tools. Technologies of oxidation of steels and Ti alloys by chemical method. Technologies of oxidation of steels and Ti alloys by electrochemical method. Technologies of fabrication of hydroxyapatite coatings by electrophoretic method.						
Prerequisites and co-requisites	Materials Science must be approved						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lectures and written exam	70.0%	70.0%
	Practical exercise	30.0%	30.0%
Recommended reading	Basic literature	1. A. Zieliński, B. Świczko-Żurek, A. Ossowska, S. Sobieszczyk. wyd. Politechniki Gdańskiej, skrypt sieciowy. 2. Biomateriały, seria Biocybernetyka i Inżynieria Biomedyczna 2000, red. S. Błażewicz, L. Stoch, Exit 2004 3. J. Marciniak, Biomateriały, wyd. Politechniki Śląskiej 2002 4. B. Świczko-Żurek, Biomateriały, wyd. Politechniki Gdańskiej 2009 (podręcznik w wersji elektronicznej) 5. M. Kutz, Biomaterials Engineering and Design Handbook, McGraw-Hill 2009	
	Supplementary literature	1. J. Marciniak, M. Kaczmarek, A. Ziębowicz, Biomateriały w stomatologii, wyd. Politechniki Śląskiej 2008 2. J. Marciniak, Z. Paszenda, Nawrat, Ćwiczenia laboratoryjne z biomateriałów, wyd. Politechniki Śląskiej 1993 3. J. Marciniak, Biomateriały w chirurgii kostnej, wyd. Politechniki Śląskiej 1992	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Characteristics of titanium bioalloys  2. Sterilisation and disinfection - aims and procedures  3. Biomaterials for orthopaedics		
Work placement	Not applicable		