



Subject card

Subject name and code	, PG_00052106						
Field of study	Nanotechnology						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2023/2024		
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	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			4.0		
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. Magdalena Jażdżewska					
	Teachers	dr inż. Magdalena Jażdżewska dr inż. Michał Bartmański dr inż. Gabriel Strugała					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	30.0	0.0	45
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	45	5.0		50.0		100
Subject objectives	The aim of the course is to prepare a design of a nanocoating or nanolayer for engineering applications or in implantology.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W07	The student has knowledge in scope of methods for obtaining coatings based on nanostructures, properties and basic research methods.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	K6_U09	The student is able to develop design assumptions any coating/ layer taking into account the area of its application.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	K6_K04	The student is able to work in a group.			[SK1] Assessment of group work skills		
K6_U02	The student is able to use the learned technologies to obtain advanced surface layers.			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information			
Subject contents	As part of design classes, students prepare their own proposal for a nanocoating or nanolayer, define the purpose of the proposed project, propose assumptions and design concepts, and prepare a project based on the selected concept. As part of laboratory classes, students prepare a nanohydroxyapatite coating on an anodized titanium alloy substrate and then determine selected properties of the obtained layers.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		50.0%	40.0%
		56.0%	60.0%
Recommended reading	Basic literature	<p>1. Burakowski T., Wierchoń T.: Inżynieria powierzchni metali. WNT Warszawa 1995.</p> <p>2. Praca zbiorowa pod redakcją Stanisława Tkaczyka.: Powłoki ochronne. Gliwice 1994.</p> <p>3. Kula P.: Inżynieria warstwy wierzchniej. Wyd. Politechniki Łódzkiej, Łódź 2000.</p> <p>4. Kusiński J.: Lasery i ich zastosowanie w inżynierii materiałowej. Kraków, Wyd. Naukowe Akapit 2000.</p> <p>5. Klimpel A.: Napawanie i natryskiwanie cieplne. Technologie. WNT Warszawa 2000</p> <p>6. Głowacka M., Łabanowski J.: Inżynieria Powierzchni Wybrane Zagadnienia, WPWSZ Elbląg 2014</p>	
	Supplementary literature	1. Dobrzański L.A.: Podstawy nauki o materiałach i metaloznawstwo. Materiały inżynierskie i podstawy projektowania materiałowego. WNT. 2002.	
	eResources addresses	Adresy na platformie eNauczenie: Nanowarstwy i nanopowłoki P, L, Nano, sem. 07, I st., sem. zimowy 2023/24 - Moodle ID: 33802 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=33802	
Example issues/ example questions/ tasks being completed	<p>Basic concepts of Surface Engineering:</p> <ul style="list-style-type: none"> • surface layer, • top layer, • protective coating. <p>Coatings used in biomedical engineering.</p>		
Work placement	Not applicable		