



## Subject card

Subject name and code	Surface treatment technologies, PG_00053713						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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		dr inż. Łukasz Pawłowski				
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						
Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15835">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15835</a>							
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 familiarize students with technologies of manufacturing of surface layers and protective coatings and assessment of selected properties of the modified surface.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W03		The student is familiar with the major trends in materials engineering and is able to relate the acquired knowledge of surface engineering to other fields of engineering knowledge.		[SW1] Assessment of factual knowledge		
	K6_U10		The student analyzes the product or element designed in terms of functions fulfilled; determines a set of material features necessary for the realization of the product; classifies their importance; determines material indicators.		[SU3] Assessment of ability to use knowledge gained from the subject		
	K6_W12		The student knows the basic principles of creating and developing forms of individual entrepreneurship, using the knowledge of scientific disciplines specific to the studied major.		[SW3] Assessment of knowledge contained in written work and projects		
	K6_U01		Students are able to acquire information from professional literature, databases and other resources, necessary to solve engineering tasks. The student is able to integrate obtained information and make interpretations, as well as to draw conclusions and present justified opinions.		[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Surface engineering in the modification of advanced structural materials and biomaterials. Fabrication and characterization of nanotube oxide films on titanium surface. Electrophoretic deposition of biopolymer coatings with metallic nanoparticles. Evaluation of the influence of surface preparation of metallic substrates on the properties of deposited coatings. Laser processing of titanium alloys. Production of electrolytic and immersion coatings. Thermal spraying and plating. Assessment of the properties of modified surfaces.</p>		
Prerequisites and co-requisites	No requirements.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory exercises	51.0%	100.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>• F.-W. Bach, K. Mohwald, A. Laarmann, T. Wenz, Modern Surface Technology, John Wiley &amp; Sons, 2006</li> <li>• M. Kutz, Biomaterials Engineering and Design Handbook, McGraw-Hill 2009</li> <li>• Rosario Pignatello, Biomaterials Science and Engineering, InTech, Croatia, 2011.</li> </ul>	
	Supplementary literature	<ul style="list-style-type: none"> <li>• B.D. Ratner, A.S. Hoffman, F.J. Schoen, J.E. Lemons, Biomaterials Science, Academic Press, San Diego, 1996</li> <li>• Q. Chen, G.A. Thouas, Metallic implant biomaterials, Materials Science and Engineering R: Reports. 87 (2015) 157</li> </ul>	
	eResources addresses	<p>Adresy na platformie eNauczanie:  Surface treatment technologies, DaPE, lab, 22/23 (PG_00053713) - Moodle ID: 29379  <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=29379">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=29379</a></p>	
Example issues/ example questions/ tasks being completed	<p>1. Basic concepts of surface engineering: surface layer, surface layer, protective coating.2. Division of coatings and requirements imposed on them - by type of material from which it is produced, by purpose, by type of protection.3. Methods of producing surface layers: substrate preparation, mechanical, thermo-mechanical, thermal, thermo-chemical, electrochemical and chemical methods, physical methods.</p>		
Work placement	Not applicable		