GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058712		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2022/2023
Education level	second-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	1	Language of instruction	Polish
Semester of study	1	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. Beata Majkowska-Marzec	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	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 getting to know the technologies of manufacturing of surface layers and protective coatings and and evaluation of selected properties of modified surfaces.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_W05	A student is able to choose the parameters of the coating deposition process for a given substrate material and application.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
K7_U03	A student is able to produce ceramic, carbon and oxide coatings by an electrophoretic method and an electro-arc oxidation. A student is able to assess the material microstructure, hardness and wettability.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
K7_W04	A student is able to plan a coating production process. A student is able to design a laser machining process with CNC coding.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
K7_U04	A student is able to prepare and present a report on the obtained research results.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	LECTURE: A division of methods and techniques for producing surface layers. Selected technologies of steel saturation with non-metals and metals. Glow processing techniques and their application. Production of surface layers by laser treatment, CVD, PVD and PLD. Electrophoretic production of ceramic, oxide and carbon coatings. Production of phosphate coatings (electrophoretic, biomimetic, laser, sol-gel). A paint coatings. An influence of technology and production conditions on a thickness, quality and properties of layers and coatings. LABORATORY: Deposition of ceramic, oxide and carbon coatings by an electrophoretic method. A micro-arc oxidation. A laser surface treatment. An evaluation of the surface microstructure of the produced coatings and surface layers using an optical microscopy and of surface wettability. Preparation of metallographic specimens. An evaluation of a thickness and microstructure of coatings and surface layers on the cross-section. DESIGN: Designing the deposition process of electrophoretic and micro-arc oxidized coatings based on a literature review. Planning activities related to the preparation of samples for testing. Selection of deposition parameters for a given material and application. Designing welding and laser texturing processes. CNC coding. Selection of laser processing parameters for a given material and application.
Prerequisites and co-requisites	Knowledge of the subject Materials Science.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	56.0%	50.0%
project	56.0%	25.0%
laboratory	56.0%	25.0%

Recommended reading

Basic literature	1. Burakowski T., Wierzchoń T.: Inżynieria powierzchni. WNT. Warszawa 2004 2. Blicharski M.: Inżynieria powierzchni, WNT, Warszawa 2009 3. Dobrzański L.A>: Podstawy nauki o materiałach i metaloznawstwo, WNT, Warszawa, 2002
Supplementary literature	none
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. A division of coatings by means of purpose. 2. Describe CVD, PVD methods. 3. What parameters affect the quality of coatings produced by electrophoresis?
Work placement	Not applicable