



Subject card

Subject name and code	, PG_00065841						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group		Specialty 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Corrosion and Electrochemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Stefan Krakowiak				
	Teachers		dr hab. inż. Stefan Krakowiak dr hab. inż. Michał Szociński dr inż. Zuzanna Zarach dr hab. inż. Paweł Ślepski dr hab. inż. Andrzej Miszczyk				
Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=6170						
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		4.0		41.0	75
Subject objectives	The aim of the course is to present to students the possibilities of modifying metal and alloy surfaces and to show the impact of these operations on corrosion resistance and functional properties.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K01] Understands the need for lifelong learning, can inspire and organize the learning process of others. Is aware of own limitations and knows when to turn to experts, can accurately determine priorities helping to achieve the tasks specified by themselves or others.	The student understands the need to update their knowledge by participating in thematic conferences and discussions with experts.	[SK4] Assessment of communication skills, including language correctness
	[K7_W05] Knows methods, techniques, tools and materials for solving complex engineering tasks relevant to materials engineering.	The student possesses the knowledge to select appropriate materials and techniques for protecting industrial installations under defined operating conditions.	[SW1] Assessment of factual knowledge
	[K7_W04] Has enhanced knowledge of materials sciences, within the scope required for describing and understanding the correlation between the chemical composition, structure and mechanical and physical properties.	The student is able to select materials and surface modification techniques to protect structures, taking into account technological capabilities and environmental constraints.	[SW1] Assessment of factual knowledge
	[K7_U04] Can undertake a detailed analysis of the obtained results and develop a technical report or presentation, also in English.	Based on results obtained in the laboratory or in the field, the student identifies the most effective method for examining the surface.	[SU2] Assessment of ability to analyse information
Subject contents	Course content – lecture 1 - Pickling and passivation of stainless steels; 2 - Conversion coatings on non-ferrous metals; 3 - Surface analysis methods – AFM, SEM. 4 - Electrode materials based on surface-modified titanium 5 - Electropolishing		
	Course content – laboratory 1 - Influence of chemical treatment of stainless steels on performance properties; 2 - Use of AFM techniques to examine the surfaces of structural materials; 3 - Conversion coatings on non-ferrous metals; 4 - Coloring of aluminum alloys; 5 - Surface modification of titanium for technologies employing electrochemical techniques;		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written assessment of the lecture material	60.0%	50.0%
	Passing the entrance tests and completing all laboratory sessions.	60.0%	50.0%
Recommended reading	Basic literature	„Chemically Modified Electrodes” – Richard C. Alkire, Dieter M. Kolb, Jacek Lipkowski, Philipp N. Ross „Atomic Force Microscopy” – Peter Eaton, Paul West (Oxford University Press, 2010)	
	Supplementary literature	„Electrochemical Methods: Fundamentals and Applications” – Allen J. Bard, Larry R. Faulkner.	
	eResources addresses		

Example issues/ example questions/ tasks being completed	Passive layer on stainless steels Influence of metallurgical inclusions on the corrosion resistance of steel Pickling and passivation of stainless steels: methods of execution Processes occurring at modified titanium electrodes Use of AFM for surface mapping Electrochemical principles of electropolishing
Practical activities within the subject	Not applicable

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