GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metal coatings, PG_00060322		
Field of study	Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
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. Andrzej Miszczyk	
	Teachers	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=4823

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	2.0	18.0	50

Subject objectives

The aim of this course is to familiarize students with metal coatings used to protect surfaces (primarily steel structures) from corrosion and to achieve aesthetic appeal. The course covers the methods used to obtain such coatings (electrolytic, immersion, and spray methods), the mechanisms of their protective action, their properties and scope of application, and quality control methods.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] Can operate typical laboratory equipment and analyze material tests	The student has the competence to operate instruments and equipment enabling the performance of analyses and measurements of metal coatings on other metal substrates.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture

Classification and types of metal coatings used in engineering practice in terms of materials and mechanism of action. Methods for obtaining metal coatings on other metals. Electrochemical methods (galvanic coatings). Immersion (hot-dip) methods. Spray methods. Advantages and disadvantages of various methods. Material characteristics of coating structures obtained by various methods. Performance properties of metal coatings in various environments. Test methods for metal coatings. Additional protection of metal coatings: conversion layers and organic coatings (duplex system). Development trends in the field of metal coatings.

Course content – laboratory

Recognizing different types of metal coatings. Identifying the coating metal and the substrate metal. Obtaining electrolytic coatings. Faraday's law. Visual assessment of surface quality. Destructive and non-destructive methods for measuring the thickness of metal coatings. Coating adhesion testing. Coating tightness testing. Measuring physical parameters of coatings (roughness, hardness, gloss). Corrosion testing of metal coatings: exposure in immersion and in natural atmospheric conditions. Estimating the durability of metal coatings under varying atmospheric corrosivity.

Prerequisites and co-requisites

Knowledge of the basic mechanisms of corrosion and destruction of metals in atmospheric and industrial environments.
Knowledge of the basic properties of metals used in engineering practice.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>laboratory</td><td>100.0%</td><td>50.0%</td></tr>
<tr><td>test</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>T. Biestek, S. Sękowski, Metody badań powłok metalowych, WNT

V. E. Carter, Metallic Coatings for Corrosion ControlCorrosion Control Series, Elsevier</td></tr>
<tr><td>Supplementary literature</td><td>papers from Corrosion Science journal</td></tr>
<tr><td>eResources addresses</td><td>Basic
https://katalogbpg.pg.edu.pl/discovery/search?query=any,contains,Metallic%20Coatings&tab=Everything&search_sco|48PGD&offset=0 - books on metal coatings in the Main Library of Gdańsk University of Technology
Supplementary
https://browzine.com/libraries/3528/journals/5945/issues/current - an overview of the content of the journal Corrosion Science</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Types of coatings based on their anticorrosive mechanism. Structure of hot-dip zinc coatings. Structure of duplex systems. Types of conversion coatings.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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