GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Construction materials in the chemical industry. Corrosion, PG_00060886		
Field of study	Chemical Technology		
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	5	ECTS credits	3.0
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	prof. dr hab. inż. Kazimierz Darowicki	
	Teachers		

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

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	5.0	40.0	75

Subject objectives

Knowledge building:
Structure of metals and alloys. Solid solutions. Physicochemical properties of metals and alloys. Corrosion susceptibility. General corrosion, pitting corrosion, stress corrosion cracking, hydrogen embrittlement, and intergranular corrosion.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] has knowledge of structural materials used in the chemical industry and their corrosion, corrosion monitoring and protection, and corrosion metrology	is able to relate the structure of metals and alloys to their corrosion properties	[SW1] Assessment of factual knowledge
[K6_U08] is able to classify and apply knowledge of the driving forces of corrosion processes in different construction materials to the design of process installations and the selection of corrosion protection methods for installations	is able to choose the corrosion protection technology and define the protection criteria.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_K01] understands the need for continuing education, and is aware of the opportunities to improve professional, personal and social competences	is ready to apply the knowledge of construction materials and corrosion phenomena in teamwork and in making responsible decisions regarding the selection and use of materials in a technical environment.	[SK2] Assessment of progress of work

Subject contents

Course content – lecture
Band theory of metals, semiconductors, and insulators. - Electrical, magnetic, and thermal properties of metals. - Types of crystal lattices of solids. - Solid solutions. - Alloys and phase transformations, heat treatment. - Iron-carbon phase diagram. - Classification of steels and cast irons. - Introduction to thermodynamics and corrosion kinetics. - Types of corrosion damage.

Course content – laboratory
1. Corrosion metallurgy. 2. Corrosion cells. 3. Corrosion of stainless steels. 4. Macro and micro assessment of corrosion damage. 5. Paint application. 6. Corrosion rate testing. 7. Physical properties of metals.

Prerequisites and co-requisites

Chemical bonds, solutions, concentrations, phase diagrams, mechanical strength, electrochemical cells

<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 - tests and reports</td><td>100.0%</td><td>50.0%</td></tr>
<tr><td>test - written 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>1. Zaki AHMAD, Principles of Corrosion Engineering and Corrosion Control, Published: 2006, Imprint: Butterworth-Heinemann, ISBN: 978-0-7506-5924-6, DOI: 10.1016/B978-0-7506-5924-6.X5000-4
2. Philip A. Schweitzer, Fundamentals of Metallic Corrosion: Atmospheric and Media Corrosion of Metals, ISBN 9780849382437</td></tr>
<tr><td>Supplementary literature</td><td>Stanisław J. Skrzypek, Karol Przybyłowicz, Metal Engineering and Material Technologies, PWN Scientific Publishing House, 2019 (metallurgical processes for obtaining metallic materials, materials processing, also in terms of environmental protection, alloy production technologies and their versatile applications.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Discuss two-component phase diagrams. Types of solid solutions. Mechanism of intergranular corrosion. List the types of corrosion damage. What crystallographic lattices are known? What metals and alloys are subject to pitting corrosion. Types of corrosion control.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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