GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metals and Alloys, PG_00061915		
Field of study	Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	4	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	dr hab. inż. Stefan Krakowiak	
	Teachers	dr hab. inż. Stefan Krakowiak	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	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	25.0	75

Subject objectives

The aim of the course is to provide students with knowledge in the field of: ferrous and non-ferrous metals and their alloys, internal structure, basic functional properties and resistance to degradation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] Can operate typical laboratory equipment and analyze material tests	The student is able to plan the time and subsequent steps necessary to evaluate the microstructure and basic properties of structural metals and alloys.	[SU4] Assessment of ability to use methods and tools
[K6_W03] Has knowledge of materials science and can relate the properties of materials with their structure and composition, knows the theoretical description of phenomena occurring in materials subjected to external factors.	The student is able to determine the resistance of a material under given operating conditions.	[SW1] Assessment of factual knowledge
[K6_K01] Understands the need to improve professional and personal competencies; is conscious of own limitations and knows when to turn to experts, properly establishes priorities helping to accomplish tasks defined by oneself or others.	The student is aware of the need to supplement his or her information regarding the properties of new metal alloys.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Course content – lecture
Lecture: Structure of metals and alloys. Metallographic structures. Iron-carbon diagram. Iron alloys. Steels, cast irons, stainless steels, special purpose steels. Non-ferrous metals. Technical alloys. Discussion of the most important alloys of copper, nickel, zinc, cobalt, Marking of metal alloys; Surface layer and surface layer. Electrochemical and chemical corrosion. Passivity and passivation. Techniques for producing surface layers. Metal coatings - types, applications, importance. Plating. **Laboratories:** Physical properties of metals; Preparation of metallographic microsections; Metallographic structures; Corrosion of stainless steels; Metal coatings, obtaining and properties; Analysis of micro- and macro-damage to metals and alloys; Conversion coatings. Methods of increasing the resistance of metals and alloys - alloy additives, protective coatings

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of the basics of physics and chemistry.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Passing the subject</td><td>100.0%</td><td>50.0%</td></tr><tr><td>Passing the laboratory</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 colspan="2">Available on e-corrosion</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Available on e-corrosion</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Basic
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44983 - The e-korozja platform contains lecture materials and materials related to the work performed during the course.</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Preparation of metallographic sections; Corrosion of nickel alloys; Copper production.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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