GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metals and Alloys, PG_00039807		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jerzy Łabanowski	
	Teachers	dr inż. Artur Sitko prof. dr hab. inż. Jerzy Łabanowski	

Lesson types and methods of instruction

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	50.0	100

Subject objectives

Delivery of basic knowledge in the field of materials science of non-ferrous alloys, and technology of surface layers and protective coatings.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W03	The student recognizes technical non-ferrous metal alloys, chemical composition, mechanical and physical properties and application	[SW1] Assessment of factual knowledge
K6_K01	Student is able to connect the acquired knowledge in the field of materials science with other fields of engineering knowledge	[SK5] Assessment of ability to solve problems that arise in practice
K6_U06	Student defines non-ferrous alloys, bearing alloys, low-melting alloys and precious metals. Classifies types of wear of metallic alloys. Presents the techniques of obtaining surface layers and presents chemical, electrolytic, immersion and welding methods for producing metal coatings.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents	LECTURE Classification and properties of non-ferrous metals. Technical non-ferrous metal alloys, chemical composition, mechanical and physical properties, application, marking. Copper and copper alloys. Light metals and their alloys (aluminum, magnesium, titanium). Nickel and its alloys. Cobalt alloys. Zinc and its alloys. Tin, lead and their alloys. Bearing alloys. Low-melting alloys. Precious metal alloys. Solid surface. The concept of coatings and surface layers. Electrochemical and chemical corrosion. Friction wear. Division of methods and techniques for the production of surface layers. Chemical and electrolytic methods of producing metal coatings. Coatings produced by immersion method and cladded coatings. Welding and detonation techniques. LABORATORY Copper alloys. Aluminum alloys. Bearing alloys. Electrolytic and immersion coatings. Coatings applied by welding techniques and plated.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Egzamin	50.0%	60.0%
zaliczenie ćwiczeń	100.0%	40.0%

Recommended reading

Basic literature	1. Podstawy materiałoznawstwa. Praca zbiorowa pod red. Marii Głowackiej. Skrypt PG, Gdańsk 2014 2. Burakowski T., Wierzchoń T.: Inżynieria powierzchni metali. WNT Warszawa 1995. 3. Głowacka M., Łabanowski J. Inżynieria powierzchni. Wybrane zagadnienia. Wyd. PWSZ w Elblągu, Elbląg 2014 4. Dobrzański L.A.: Metalowe materiały inżynierskie. WNT, Warszawa, 2004. 5. Kula P.: Inżynieria warstwy wierzchniej. Wyd. Politechniki Łódzkiej, Łódź 2000.
Supplementary literature	Praca zbiorowa pod redakcją Stanisława Tkaczyka.: Powłoki ochronne. Gliwice 1994.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Give the definitions of the basic copper alloys 2. Brass: division, rules of marking, heat treatment. 3. Bronzes: classification, rules of marking, heat treatment. 4. What are the properties and application of aluminum. 5. What are the difficulties when welding aluminum and aluminum alloys? 6. List the most important nickel alloys, describe their properties and applications. 7. List the most important titanium alloys, describe their properties and applications. 8. List the most important magnesium alloys, describe their properties and applications. 9. What are bearing alloys? 10. What are the methods for creating metal protective coatings? 11. Describe the technology of electroplated metal coatings. 12. Describe the technology of metal immersion coatings. 13. Describe the technology of metal spray coatings. 14. List the technologies of obtaining welded surface layers
Work placement	Not applicable