GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Material Science II, PG_00040039		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2020/2021
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	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Grzegorz Gajowiec	
	Teachers	dr Maria Głowacka dr inż. Robert Skoblik	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	8.0	0.0	15.0	0.0	0.0	23

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=14338
Adresy na platformie eNauczanie:

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	23	5.0	72.0	100

Subject objectives

Introduction to practical knowledge of material science in aspect of methods investigation, competence for carrying out the tests and analysis their results.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U10] is able to formulate the principles of selecting a material for a construction, ensuring the correct operation of a device	Student is able to point out the essential properties of engineering materials in aspect of the device's exploitation.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	Student is able to define the useful property of material by himself, applying professional references. Student is able explain the differences at material properties, being relative to chemical composition, microstructure, and heat treatment states.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_W03] possesses and is able to practically apply the knowledge on the construction, properties and testing methods of construction materials	Student knows the methods of shaping mechanical properties of metallic structural materials. Student selects engineering materials to proper applying.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>LECTURE: Methods of investigation of the material engineering.
Industrial laboratories.
Case studies of the damage of machines units.

LABORATORY:
1. Macroscopic and microscopic examinations of the materials. Vickers hardness test.
2. Phase diagram of Fe-C; phases and microstructures of iron-carbon alloys.
3. Carbon steels; evaluation of non-metallic inclusions at steel. Heat treatment processes; normalisation and spheroidizing annealing.
4. Quenching, tempering, TTT diagrams, Jominy test of the steel hardenability, surface hardening.
5. Graphite cast iron; application for units of machines.
6. Carbon tool steels and high-speed steels; heat treatment, microstructures, Rockwell hardness.
7. Non-ferrous alloys; copper alloy, aluminium alloy and bearings metal.
8. Corrosion-resistant austenitic steels; steel grade selection for proper application.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Completed course "Material Science I, sem. 1"</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>60.0%</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>100.0%</td><td>100.0%</td><td>80.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Metaloznawstwo. Materiały do ćwiczeń laboratoryjnych. Pr. zb. (red. J. Hucińska). Wyd. PG, Gdańsk, 1995.
2. Podstawy Materiałoznawstwa. Pr. zb. (red. M. Głowacka i A. Zieliński). Wyd. PG, Gdańsk, 2014.
3. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, W-wa, 2003.
4. Blicharski M.: Inżynieria Materiałowa. Stal. WNT, W-wa, 2017
5. Dobrzański L.: Podstawy nauki o materiałach i metaloznawstwo. WNT, Gliwice-Warszawa, 2002.
6. Dobrzański L.A.: Materiały inżynierskie i projektowanie materiałowe. WNT, Warszawa, 2005.
7. Ashby F.A., Jones D.R.: Materiały inżynierskie. Tom I. 1995, T. II. WNT, Warszawa 1996.
8. Przybyłowicz K.: Metaloznawstwo. PWN Warszawa 2011</td></tr>
<tr><td>Supplementary literature</td><td>1. Prowans. S.: Struktura stopów. PWN W-wa 2000.
2. Skrzypek S., Przybyłowicz K. (red.): Inżynieria metali i stopów. Wyd. AGH Kraków 2012
3. Przybyłowicz K., Przybyłowicz J.: Materiałoznawstwo w pytaniach i odpowiedziach. WNT, W-wa, 2004.
4. Głowacka M., Łabanowski J.: Inżynieria powierzchni. Wybrane zagadnienia. Wyd. PWSZ w Elblągu, Elbląg 2014.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Phases existing at the carbon steel.
Heat treatment of structural steels.
Parameters influencing to hardenability of steel.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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