



Subject card

Subject name and code	Material Science II, PG_00040039						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022		
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 inż. Grzegorz Gajowiec				
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						
	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_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		
	[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.		[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[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		

Subject contents	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.		
Prerequisites and co-requisites	Completed course "Material Science I, sem. 1"		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	100.0%	100.0%	80.0%
	60.0%	60.0%	20.0%
Recommended reading	Basic literature	1. Metaloznawstwo. Materiały do ćwiczeń laboratoryjnych. Pr. zb. (red. J. Hucińska). Wyd. PG, Gdańsk, 1995. 2. Podstawy Metaloznawstwa. 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	
	Supplementary literature	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.: Metaloznawstwo w pytaniach i odpowiedziach. WNT, W-wa, 2004. 4. Głowacka M., Łabanowski J.: Inżynieria powierzchni. Wybrane zagadnienia. Wyd. PWSZ w Elblągu, Elbląg 2014.	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	Phases existing at the carbon steel. Heat treatment of structural steels. Parameters influencing to hardenability of steel.	
Work placement	Not applicable		