

表 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials science, PG_00055864							
Field of study	Power Engineering, Power Engineering							
Date of commencement of studies	October 2023		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	1		Language of instruction			Polish		
Semester of study	1		ECTS credits		3.0			
Learning profile	general academic profile		Assessment form		assessment			
Conducting unit	Department of Materials Engineering Technology		and Bonding -> Faculty of Mechanical Engineering and Ship					
Name and surname	Subject supervisor		prof. dr hab. inż. Jerzy Łabanowski					
of lecturer (lecturers)	Teachers		dr inż. Beata Majkowska-Marzec					
			dr inż. Magda Rościszewska					
			dr hab. inż. Agnieszka Ossowska					
			prof. dr hab. inż. Jerzy Łabanowski					
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	aboratory Project		Seminar	SUM
of instruction	Number of study hours	30.0	0.0	15.0 0.0			0.0	45
	E-learning hours inclu	ided: 0.0						
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	I didactic Participation in ed in study consultation hours		Self-study		SUM	
	Number of study hours	45		3.0		27.0		75
Subject objectives	The aim of this course is to provide students with the knowledge in the field of materials science and materials technologies necessary for an engineer with a specialization in Power Engineering							
Learning outcomes	Course outcome		Subject outcome			Method of verification		
	[K6_U01] can obtain information from literature and other sources, organize, interpret it and draw and formulate conclusions; has the ability to self-educate, interprets the results of completed engineering tasks, is able to design simple energy systems and their systems		Student can choose the right materials for applications in the power industry. He knows the differences in their properties and processing methods			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W04] has structured knowledge of mechanics, including the issues of material strength and general principles of shaping structures, necessary to conduct basic strength analyzes and design simple mechanical or construction systems for power industry or environmental engineering; knows the basics of machine construction and the most commonly used construction and operating materials		The student has a knowledge of the materials science of iron and its alloys, non-ferrous metals, polymeric and ceramic materials necessary for an engineer with a specialization in Power Engineering. He knows the basic material technologies.			[SW1] Assessment of factual knowledge		

Subject contents	COURSE CONTENT The structure of materials. Characteristics of the major groups of materials. Metals. Ceramic materials. Polymers. Composite materials. Rules for the selection of engineering materials. Crystalline structure of materials. Defects in the crystal structure. Polymorphism. Crystallization of metals and alloys. Mechanical properties of materials. Methods of testing materials. Working conditions and wear mechanisms of engineering materials. Alloys. Strengthening of metals and alloys, phase transformations. Phase equilibrium systems. Transformations in the solid state. System phase equilibrium iron-carbon. The division and classification of steel. Structural steels. Steels with special properties - corrosion resistant, heat resistant and creep resistant. Casting alloys. Cast steel and cast iron. Technological methods for structure and mechanical properties modeling. Plastic processing, thermal and thermo-chemical treatment. Annealing, hardening, carburizing, nitriding. Technical non-ferrous alloys. Copper and its alloys. Light metals and their alloys. Metallic materials for power plant industry. Ceramics and glass. Properties of ceramic materials. Methods of manufacture and shaping of ceramic materials. Polymeric materials. Structure of polymers. Thermoplastic polymers. Thermosetting polymers. Elastomers. Processing of polymers. Properties of polymers. Composite materials.				
Prerequisites and co-requisites	Not required				
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade		
	pass tests in the laboratory	100.0%	20.0%		
	written exam	50.0%	60.0%		
	laboratory reports	100.0%	20.0%		
Recommended reading	Basic literature	 Podstawy Materiałoznawstwa. Praca zbiorowa pod red M.Głowackiej. Politechnika Gdańska 2014. Metaloznawstwo. Praca zbiorowa pod red. M. Głowackiej. Skrypt Politechniki Gdańskiej. Wyd.3. Gdańsk 1996. Blicharski M. Wstęp do inżynierii materiałowej. Wyd. AGH, Kraków 2003. Materiały do ćwiczeń laboratoryjnych z metaloznawstwa. Skrypt Politechniki Gdańskiej Wyd.2. Gdańsk 1995. 			
	Supplementary literature	1. Dobrzański L.: Podstawy nauki o materiałach i metaloznawstwo. WNT Warszawa 2002. 2. Przybyłowicz K.: Metaloznawstwo. WNT, Warszawa, 1992. 3. Dobrzański L.A.: Materiały inżynierskie i projektowanie materiałowe. WNT, Warszawa, 2005.			
	eResources addresses	Adresy na platformie eNauczanie:			

Example issues/ example questions/	Give the characteristics of metals and metal alloys .				
tasks being completed	Give the characteristics of polymers.				
	What are composites ?				
	Explain the phenomenon of polymorphism .				
	What allotropic varieties have iron ?				
	What are defects in the crystal structure ?				
	The principle of measuring the hardness of the method : a - Vickers , b - Rockwell , c - Brinell				
	Explain the Charpy impact test method .				
	What is a hot forming of metals?				
	Draw the system Fe - Fe3C with description				
	What are the advantages and disadvantages of gray cast iron ?				
	Give the definition of steel and cast steel.				
	How the carbon affects the mechanical properties of steels ?				
	What determines the corrosion resistance of steel ?				
	What is heat resistance and creep resistance of steel ?				
	Alloys designed to work at elevated temperatures -				
	Describe structural steels				
	Descrine stainless steels				
	Explain annealing heat treatment.				
	What is the hardening of steel ?				
	Explain thermo-chemical heat treatment carburizing of steel				
	Explain thermo-chemical heat treatment nitriding of steel				
	Give the definitions of basic copper alloys.				
	Characteristics of aluminum wrought and cast alloys.				
	Characteristics of polymers				

	What are elastomers .
	What are plastomers .
	Enter the properties and methods of the processing of thermopl
Work placement	Not applicable