

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of materials engineering , PG_00061891								
Field of study	Materials 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			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Institute Of Nanotechnology And Materials Engineering -> Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej								
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Aleksandra Mielewczyk-Gryń						
	Teachers		dr hab. inż. Aleksandra Mielewczyk-Gryń						
			dr hab. inż. Łukasz Piszczyk						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	0.0	0.0	0.0		0.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation in classes include		I didactic Participation in consultation hours		Self-study		SUM		
	Number of study hours	30		3.0		17.0		50	
Subject objectives	The aim of the lecture is to introduce the students with selected issues of modern materials science and engineering.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[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.		Student has basic knowledge in the field of materials science and engineering.			[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 understands the need to improve professional competence.			[SK2] Assessment of progress of work			
	[K6_W06] Knows selected methods, techniques, tools and materials used in solving simple engineering problems within the scope of materials engineering.		Student knows the basic research methods and technological processes used in materials engineering.			[SW1] Assessment of factual knowledge			

Subject contents	Engineering materials. Properties of engineering materials. Periodic table of elements. Electronic configurations of elements, sizes of atoms and ions; ionization potentials; electron affinity; electronegative and electropositive elements; Bonds of atoms in a crystal, Classification and characteristics of bonds; Comparative characteristics of bonds; Basics of crystallography; Definitions of stress, strain and elastic modulus; Hooke's law; Static tensile test; Elastic properties of a system of two atoms; Perfect durability; Crystal imperfections and defects in metals and ceramics: Principles of measuring the hardness of metals using the Brinell, Vickers and Rockwell methods. Dynamic hardness measurements, hardness and yield strength. Phase equilibrium systems. Phase equilibrium diagram of the Fe-C system. Metals and their alloys. Ceramic materials and glass. Advanced ceramic materials. Polymers and composites. Physico-chemical properties of materials.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	Writing test	50.0%	100.0%				
Recommended reading	Basic literature	 Michael Ashby, Hugh Shercliff and David Cebon, Materials Engineering, Science, Processing and Design, Elsevier Ltd, 2007 Michael Ashby, David Jones, Engineering Materials 1, An Introduction to Properties, Applications, and Design, Elsevier Ltd, 2012 Michael Ashby, David Jones, Engineering Materials 2, An Introduction to Microstructures and Processing, Elsevier Ltd, 2013 W. D. Callister, Jr., Materials science and engineering, an introduction, 7th ed., Wiley, 2007, ISBN 0-471-73696-1. 					
	Supplementary literature	 1. A.J. Moulson, , J.M. Herbert, Electroceramics, Materials Properties and Applications, Chapman and Hall, 1990 2. R. Pampuch, An Introduction to Ceramics, Springer International Publishing Switzerland, 2014 					
	eResources addresses	Adresy na platformie eNauczanie: Podstawy inżynierii materiałowej - Moodle ID: 33121 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33121					
Example issues/ example questions/ tasks being completed	 Periodic table of elements, law of periodicity Binding of atoms in a crystal - the essence, classification and characterization of atomic bonds Definitions of stress, strain and modulus of elasticity Basic properties of metal, ceramic, polymer and composite materials Semiconductors 						
Work placement	Not applicable						

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