



Subject card

Subject name and code	Fundamentals of materials engineering , PG_00061891						
Field of study	Materials Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Aleksandra Mielewczyk-Gryń				
	Teachers		dr hab. inż. Aleksandra Mielewczyk-Gryń				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	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 didactic classes included in study plan		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_K01] is ready to continuously expand his knowledge in materials engineering and related sciences, to critically evaluate this knowledge, and to recognise its importance in solving practical and cognitive problems; is aware of his own limitations and knows when to seek expert advice.		The student understands the need to improve professional competence.			[SK2] Assessment of progress of work	
	[K6_W03] has knowledge of materials science that enables one to relate the properties of materials to their structure and composition; is familiar with the theoretical description of phenomena occurring in materials subjected to external factors and understands the processes taking place throughout their life cycle		Student has basic knowledge in the field of materials science and engineering.			[SW1] Assessment of factual knowledge	
[K6_W06] has knowledge of the principles of experimental design, experimental methods, measurement techniques, and the tools and materials used in solving complex engineering problems in materials engineering.		Student knows the basic research methods and technological processes used in materials engineering.			[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture 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	<ol style="list-style-type: none"> 1. Michael Ashby, Hugh Shercliff and David Cebon, <i>Materials Engineering, Science, Processing and Design</i>, Elsevier Ltd, 2007 2. Michael Ashby, David Jones, <i>Engineering Materials 1, An Introduction to Properties, Applications, and Design</i>, Elsevier Ltd, 2012 3. Michael Ashby, David Jones, <i>Engineering Materials 2, An Introduction to Microstructures and Processing</i>, Elsevier Ltd, 2013 4. W. D. Callister, Jr., <i>Materials science and engineering, an introduction</i>, 7th ed., Wiley, 2007, ISBN 0-471-73696-1. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. 1. A.J. Moulson, , J.M. Herbert, <i>Electroceramics, Materials Properties and Applications</i>, Chapman and Hall, 1990 2. 2. R. Pampuch, <i>An Introduction to Ceramics</i>, Springer International Publishing Switzerland, 2014 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Periodic table of elements, law of periodicity 2. Binding of atoms in a crystal - the essence, classification and characterization of atomic bonds 3. Definitions of stress, strain and modulus of elasticity 4. Basic properties of metal, ceramic, polymer and composite materials 5. Semiconductors 		
Practical activities within the subject	Not applicable		

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