



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	Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
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 of instruction	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_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	<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	Adresy na platformie eNauczanie: Podstawy inżynierii materiałowej - Moodle ID: 33121 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=33121	
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 		
Work placement	Not applicable		