



Subject card

Subject name and code	Basics of Materials Engineering I, PG_00039782						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2020/2021		
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	2		ECTS credits		3.0		
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		prof. dr hab. inż. Andrzej Zieliński				
	Teachers		prof. dr hab. inż. Andrzej Zieliński				
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						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11604 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	30		10.0		35.0	75
Subject objectives	The aim of the course is a gaining of fundamental knowledge on kinds of materials, desgins and choice of materials, fabrication of materials, treatment of materials. Another aim is an achievement of skills to solve, based on gained knowledge, simple engineering tasks in area of materials engineering.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K01	The student understands the need for lifelong learning and the impact of knowledge and the acquisition of appropriate competences. The student can predict the impact knowledge and skills in the area knowledge about materials on your own future professional life. The student can assess their deficiencies and define measures to eliminate them. The student knows how to use engineering logic related to the tasks performed.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
	K6_W03	The student has a basic knowledge of the construction of materials, strength of materials, testing methods, heat and plastic treatment, types of materials. He/ she can predict phenomena occurring in materials under the influence of external factors.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K6_U01	The student is able to analyze problems, simulate phenomena and processes, as well as use devices in the field of materials science and materials engineering. In particular, the student can find and interpret relationships between structure, chemical bonds and properties and the use of materials.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
Subject contents	Genesis and tasks of materials science and engineering. Development tendency of materials science. Classification and general characteristics of materials. Chemical bonding. Principles of crystallography. Structure of metals, ceramics, polymers. Point and linear defects of crystalline structure. Diffusion: equations and mechanisms. Grain boundaries. Monocrystals and polycrystals. The influence of crystalline structure defects on mechanical properties of metals. Structure of metal alloys. Solid solutions. Intermetallic compounds. Thermodynamic equilibrium. Gibbs phase rule. Binary and ternary phase diagrams. Phase transformations. Examinations of material structure. Material properties. Examinations of mechanical properties. Crystallization from liquid phase: nucleation, growth of crystals, kinetics of crystallization. Technical aspects of crystallization. Plastic deformation of metals. Mechanisms of plastic deformation. Transformations in metals caused by cold-work. Recovery and recrystallization. Technical aspects of plastic deformation and recrystallization. Phase diagram iron-carbon and iron-cementite. Iron-carbon alloys: carbon steels, carbon cast steels and cast irons.		
Prerequisites and co-requisites	No requirements.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written test during and at the end of semester	50.0%	100.0%
Recommended reading	Basic literature	1. Blicharski M.: Inżynieria materiałowa. Stal. WNT, Warszawa 2004. 2. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, Warszawa 2004. 3. Dobrzański L.A.: Podstawy nauki o materiałach i metaloznawstwo. WNT, Warszawa, 2002 4. Grabski W., Kozubowski J.: Istota inżynierii materiałowej geneza, istota, perspektywy. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003. 5. Praca zbiorowa pod red. M. Głowackiej: Metaloznawstwo. Wyd. Politechniki Gdańskiej, Gdańsk 1996 (także strona sieciowa Politechniki Gdańskiej).	
	Supplementary literature	1. Dobrzański L.A.: Metalowe materiały inżynierskie. WNT Warszawa 2004 2. Przybyłowicz K.: Metaloznawstwo. WNT, Warszawa 2003.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Calculate the composition of metallic alloy and quantities of specific phases based on phase diagram. 2. Propose the heat treatment scheme for desired mechanical properties. 3. Propose materials for specific applications.		
Work placement	Not applicable		