



Subject card

Subject name and code	Material Science II, PG_00033417						
Field of study	Mechatronics, Mechatronics						
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. Dionizy Czekaj					
	Teachers	prof. dr hab. inż. Dionizy Czekaj mgr inż. Magda Rościszewska Dorota Rogala-Wielgus Ewa Kozłowska dr inż. Tomasz Seramak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Materiaoznawstwo II (M:31386W1) - Moodle ID: 12402 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12402						
	Additional information: Laboratory classes: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12403						
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	45	5.0	25.0	75		
Subject objectives	To explain students some key issues in the field of Materials Science.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U03	The student knows and can appreciate the role of self-education in order to improve his/her skills			[SU2] Assessment of ability to analyse information		
	K6_W05	The Student has basic knowledge in the field of Materials Science			[SW1] Assessment of factual knowledge		
	K6_U01	The Student is able to independently access the source information using library catalogues - both analog and digital			[SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Engineering materials. Properties of engineering materials: economic, mechanical, non-mechanical volumetric properties, surface properties, production, aesthetic; price and availability of materials. Phase diagrams. Phase equilibrium systems; Gibbs rule of phases; Two-component equilibrium systems; Phase equilibrium system with unlimited solubility of components in the solid state; Phase equilibrium systems with eutectic transformation; Weight fraction of phases - the rule of leverage; The "iron - carbon" equilibrium system; TTT charts; diffusion transformations; bainite transformation; martensitic transformation. Heat treatment of steel; Hardening; tempering; temper brittleness; temper; annealing; surface treatment. Metals and their alloys. Steels: ingredients; pollutions; alloying elements in steel; the influence of alloying elements on the properties of steel; Steel types: construction steels; tool steels; steels with special properties. Cast iron; Non-ferrous alloys: Al alloys; Cu alloys; Ni and Co alloys; Ti alloys. Ceramics and glass. Modern (advanced) ceramic materials; Refractory materials. Ceramic abrasives; Glass and glass-ceramics. Thermoplastic polymers (thermoplastics); Thermosetting polymers; Elastomers (rubbers). Properties of polymers. Fibrous composites; Aggregate composites: concrete, sintered carbides; Comparisons of mechanical properties of composites and metal alloys.</p>			
Prerequisites and co-requisites				
Assessment methods and criteria	Subject passing criteria		Passing threshold	Percentage of the final grade
	Laboratory classes		100.0%	50.0%
	Colloquium from the lecture		51.0%	50.0%
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 	
	Supplementary literature		<ol style="list-style-type: none"> 1. W. D. Callister, Jr., <i>Materials science and engineering, an introduction</i>, 7th ed., Wiley, 2007, 2. A.J. Moulson, , J.M. Herbert, <i>Electroceramics, Materials Properties and Applications</i>, Chapman and Hall, 1990 3. 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. Properties of engineering materials 2. Phase equilibrium systems 3. TTT charts. 4. Non-ferrous alloys 5. Modern (advanced) ceramic materials 			
Work placement	Not applicable			