



## Subject card

Subject name and code		Material science, PG_00040032						
Field of study		Mechanical Engineering, Mechanical 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		Part-time studies	Mode of delivery			at the university		
Year of study		1	Language of instruction			Polish		
Semester of study		1	ECTS credits			3.0		
Learning profile		general academic profile	Assessment form			exam		
Conducting unit		Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)		Subject supervisor		dr hab. inż. Marek Szkodo				
		Teachers		dr Maria Głowacka				
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						
		Materiaoznawstwo I - W, nst, sem 1, (M:31906WO) - Moodle ID: 10626 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10626">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10626</a>						
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	5.0		40.0	75	
Subject objectives		Introduction of the material engineering bases essential for mechanical engineer						
Learning outcomes		Course outcome	Subject outcome			Method of verification		
		[K6_W03] possesses and is able to practically apply the knowledge on the construction, properties and testing methods of construction materials	Student knows the methods of shaping mechanical properties of engineering materials. Student selects the proper engineering materials for appropriate application.			[SW1] Assessment of factual knowledge		
		[K6_U10] is able to formulate the principles of selecting a material for a construction, ensuring the correct operation of a device	Student defines the basic group of engineering materials. Student explains the differences in mechanical and physical properties of the materials; depend on chemical composition, micro-structure and heat treatment's state.			[SU3] Assessment of ability to use knowledge gained from the subject		
		[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	Student point out essential properties of structural materials; metals, ceramics, polymers, composites, influenced to device properties.			[SW1] Assessment of factual knowledge		
Subject contents		LECTURES; General characteristic of material engineering groups; metals, ceramics, polymers and composites. The rules for materials selection in machines structure. Mechanical properties of materials. Crystalline structure of materials and structures defects. Crystallization of metals and alloys. Methods of materials investigation. Phase diagrams, transitions at the solid state. Phase diagram of Fe-C. Classification of steel. Structure steels, applications. Tool steels; alloy additions, heat treatment, tools hardness. Corrosion resistant steels, heat-resistant steels and creep-resistant steels. Cast iron and cast steel. Shaping structure and properties of materials engineering by production technology methods. Plastic working of metals, heat treatment and cementation; annealing, quenching, tempering, carburizing. Technical alloys of non-ferrous metals; copper alloys, light metals alloys. Ceramics and glasses. Production methods and shaping of the ceramics, properties of the ceramics. Polymers; structures, processing of polymers and properties. Composites. Mechanisms of the material engineering wear and tear.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	60.0%	80.0%
	Colloquium	60.0%	20.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Blicharski M.: Wstęp do inżynierii materiałowej, WNT, Warszawa 2001</li> <li>2. Blicharski M.: Inżynieria materiałowa. Stal, WNT W-wa 2017</li> <li>3. Dobrzański L.: Podstawy nauki o materiałach i metaloznawstwo. WNT Warszawa 2002.</li> <li>4. Dobrzański L.A.: Materiały inżynierskie i projektowanie materiałowe. WNT, Warszawa, 2005</li> <li>5. Ashby M.F., Jones D.: Materiały inżynierskie; właściwości i zastosowanie, T1, WNT, W-wa, 1995. T2: Materiały inżynierskie; kształtowanie struktury i właściwości, dobór materiałów WNT, W-wa 1996.</li> <li>6. Głowacka M., Zieliński A. (Red): Podstawy metaloznawstwa, Wyd. Politechniki Gdańskiej, Gdańsk 2014</li> <li>7. Przybyłowicz K.: Metaloznawstwo. PWN Warszawa 2011.</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Prowans. S.: Struktura stopów. PWN W-wa 2000.</li> <li>2. Skrzypek S., Przybyłowicz K. (red.): Inżynieria metali i stopów. Wyd. AGH Kraków 2012</li> <li>3. Głowacka M., Łabanowski J.: Inżynieria powierzchni. Wybrane zagadnienia. Wyd. PWSZ w Elblągu, Elbląg 2014.</li> <li>4. Oczos K.: Kształtowanie ceramicznych materiałów technicznych. Oficyna Wyd. Polit. Rzeszowskiej, Rzeszów 1995</li> </ol>	
	eResources addresses	<p>Podstawowe</p> <p><a href="http://www.elsevier.com">http://www.elsevier.com</a> - Publications contain the basis knowledge in materials engineering</p> <p>Uzupełniające</p> <p><a href="http://www.openaccesslibrary.com">http://www.openaccesslibrary.com</a> - Handbook consists the material's basis knowledge in crystallization of metals, plastic working, heat treatment and cementation, chemical composition characteristics microstructures, exploitation properties, sintered metals, appropriated for machine elements being under mechanical, heating and chemical duty.</p>	
Example issues/ example questions/ tasks being completed	<p>Allotropic transitions of iron.</p> <p>Base of hardness probe: a) Vickers, b) Rockwell, c) Brinell</p> <p>Influence of carbon on mechanical properties of steel</p> <p>The role of chromium to corrosion resistance of steels.</p>		
Work placement	Not applicable		