



Subject card

Subject name and code	Material science, PG_00055194						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
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 inż. Grzegorz Gajowiec				
	Teachers		dr inż. Grzegorz Gajowiec				
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		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_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		
	[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		
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	1. Blicharski M.: Wstęp do inżynierii materiałowej, WNT, Warszawa 2001 2. Blicharski M.: Inżynieria materiałowa. Stal, WNT W-wa 2017 3. Dobrzański L.: Podstawy nauki o materiałach i metaloznawstwo. WNT Warszawa 2002. 4. Dobrzański L.A.: Materiały inżynierskie i projektowanie materiałowe. WNT, Warszawa, 2005 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. 6. Głowacka M., Zieliński A. (Red): Podstawy materiałoznawstwa, Wyd. Politechniki Gdańskiej, Gdańsk 2014 7. Przybyłowicz K.: Metaloznawstwo. PWN Warszawa 2011.	
	Supplementary literature	1. Prowans. S.: Struktura stopów. PWN W-wa 2000. 2. Skrzypek S., Przybyłowicz K. (red.): Inżynieria metali i stopów. Wyd. AGH Kraków 2012 3. Głowacka M., Łabanowski J.: Inżynieria powierzchni. Wybrane zagadnienia. Wyd. PWSZ w Elblągu, Elbląg 2014. 4. Ocoś K.: Kształtowanie ceramicznych materiałów technicznych. Oficyna Wyd. Polit. Rzeszowskiej, Rzeszów 1995	
	eResources addresses		
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		