



## Subject card

Subject name and code	Construction Materials, PG_00055369						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
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			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Krzysztofowicz					
	Teachers	dr inż. Alicja Stanisławska dr inż. Łukasz Pawłowski dr inż. Grzegorz Gajowiec dr inż. Krzysztof Krzysztofowicz dr inż. Beata Majkowska-Marzec dr hab. Agata Lisińska-Czekaj					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	0.0	30.0	0.0	0.0	75
	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	75	6.0		69.0	150	
Subject objectives	Acquainting with the basic concepts of materials science as well as the construction and application of construction materials						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	<p>[K6_W03] possesses and is able to practically apply the knowledge on the construction, properties and testing methods of construction materials</p>	<p>Student defines types of materials, crystal systems, phase equilibrium systems. The student distinguishes between individual materials within a given group, heat treatment and plastic treatment. The student knows the basic sources of obtaining information about materials.</p> <p>Community Verified icon Open in Google Translate</p> <ul style="list-style-type: none"> <li>Feedback</li> </ul> <p>Tłumacz Google <a href="https://translate.google.com">https://translate.google.com</a> › ... Bezpłatna usługa Google szybko przetłumaczy słowa, zwroty i strony internetowe z polskiego na ponad 100 innych języków i odwrotnie. Find results on karpacz Tłumacze przysięgli - Ministerstwo Sprawiedliwości - Portal Gov.pl olx Tłumacz lex Zawód tłumacza przysięgłego. - Dz.U.2019.1326 tj poznani Tłumacze przysięgli gazeta MWC 2021: Vasco Translator M3, czyli elektroniczny tłumacz z ... Map of tłumacz "Pol-De-Nid" - Tłumacz przysięgły języka niderlandzkiego i niemieckiego Magdalena Raczkowska 5.0 (9) · Translator Sobieskiego 14 · 880 573 444 Open Closes 8PM Website Directions Tłumacz przysięgły j. szwedzkiego Katarzyna Kot 5.0 (5) · Translator 10+ years in business · Do Studzienki 29B/11 · 603 923 324 Open Closes 5PM Website Directions Biuro Tłumaczeń Małgorzata Ścibiwołk - Tłumacz języka ukraińskiego 4.5 (31) · Translator 10+ years in business · Jaškowa Dolina 65 · 58 348 06 31 Website Directions View all</p> <p>Tłumacz DeepL - najlepszy translator na świecie <a href="https://www.deepl.com">https://www.deepl.com</a> › translator Natychmiast tłumacz teksty i całe pliki – szybko, dokładnie i bezpiecznie. Aktualnie dostępne języki to angielski, bułgarski, chiński, czeski, duński, ...</p> <p>Tłumacz PONS   Tłumaczenie tekstu uzupełnione słownikiem <a href="https://pl.pons.com">https://pl.pons.com</a> › tłumaczenie-tek... Translate this page Tłumacz tekstu PONS - teraz z wieloma praktycznymi funkcjami. Użytkownicy PONS od ponad 10 lat korzystają z naszego Tłumacza tekstu dostępnego obecnie w 38 ...</p>	<p>[SW1] Assessment of factual knowledge</p>

	Course outcome	Subject outcome	Method of verification
		<p>Tłumacz – Wikipedia, wolna encyklopedia  <a href="https://pl.wikipedia.org">https://pl.wikipedia.org</a> › wiki › Tłu...  Translate this page  Tłumacz – osoba, która dzięki znajomości co najmniej dwóch języków dokonuje przekładu wypowiedzi lub tekstu pisanego z języka źródłowego na język docelowy.</p> <p>NOWY TŁUMACZ - bab.la  <a href="https://pl.bab.la">https://pl.bab.la</a> › tłumacz  Znajdź natychmiastowe tłumaczenia na ponad 90 języków, w tym polski, angielski i wiele innych. Wszystkie nasze tłumaczenia są wykonane z wymowy, definicji, ...</p> <p>Google Translate - Apps on Google Play  <a href="https://play.google.com">https://play.google.com</a> › store › apps › details  Text translation: Translate between 108 languages by typing  • Tap to Translate: Copy text in any app and tap the Google Translate icon to translate (all ...  Rating: 4.5 · 7,991,450 votes · Free · Android · Utilities/Tools</p> <p>tłumacz - Translation into English - examples Polish   Reverso ...  <a href="https://context.reverso.net">https://context.reverso.net</a> › translation › tłumacz  Translations in context of "tłumacz" in Polish-English from Reverso Context: Pracuje jako tłumacz w firmie ubezpieczeniowej.</p> <p>Tłumacz, translator, słownik angielski, niemiecki, rosyjski, polski  <a href="https://translatca.pl">https://translatca.pl</a>  Translate this page  Najlepszy translator, tłumacz oraz słowniki: angielski, niemiecki, rosyjski w jednym serwisie Wydawnictwa Naukowego PWN.</p> <p>Tłumacz Google  <a href="https://translate.google.pl">https://translate.google.pl</a> › translate_t  Translate this page  No information is available for this page.  Learn why</p> <p>Tłumacz Google – wady i zalety - Agencja Skrivanek - Biuro ...  <a href="https://skrivanek.pl">https://skrivanek.pl</a> › tłumacz-google...  Translate this page  Jun 21, 2021 — Jak każde rozwiązanie technologiczne oprócz niewątpliwych zalet Tłumacz Google posiada również kilka wad, które warto wziąć pod uwagę.  Related searches  tłumacz polsko-niemiecki  tłumacz angielski  tłumacz przysięgły  tłumacz polsko angielski  tłumacz angielski polski  deepL  pons tłumacz  tłumacz na ukrainie  1  2  3  4</p>	

	Course outcome	Subject outcome	Method of verification
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	[K6_U10] is able to formulate the principles of selecting a material for a construction, ensuring the correct operation of a device	The student analyzes the relationships between the structure of the material and its properties. The student explains the concepts of imperfections of the crystal structure, crystallization, heat and plastic treatment. The student analyzes the changes in the structure of the material under the influence of heat and plastic treatment. The student defines the concepts of steels and non-ferrous alloys, ceramics and polymers, and the most important alloys in this area, along with their properties and application.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W08] possesses knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	The student is able to indicate the type and method of machining the material of the part. The student analyzes the types of degradation and their relationship with the properties of the material.	[SW1] Assessment of factual knowledge
Subject contents	<p>ecture Materials and their importance in technology. The structure of matter. Characteristics of the main groups of materials. General rules for the selection of engineering materials in machine building. Crystalline structure of materials. Crystal structure defects. The influence of structure defects on the mechanical properties of materials. Polymorphism. Crystallization of metals and alloys. Mechanical properties of materials. Materials testing methods. Properties anisotropy. Material degradation. Brittle cracking. Fatigue of materials. High temperature degradation. Chemical, electrochemical and biological corrosion. Forms of corrosion: general, local, galvanic, selective, intercrystalline, gas, stress, fatigue, hydrogen, shock attack, cavitation erosion. Metal alloys. Mechanisms of strengthening metals and alloys, phase transitions. Phase equilibrium systems. Classification of phase transformations. Solid state transformations. Iron-carbon phase equilibrium system. Phase and structural components of the system. Manufacture of iron and its alloys. Pig iron metallurgy. Steel metallurgy. Steelmaking processes. Cast iron metallurgy. Methods of producing semi-finished products and products. Division and classification of steel. Alloy and unalloyed steels. Structural steels. Tool steels. Steels with special properties - corrosion-resistant steels, heat-resistant and heat-resistant steels. Foundry iron alloys. Cast steel and cast iron. Standardization and classification as well as steel and cast iron marking systems. Shaping the structure and properties of engineering materials by technological methods. Crush and recrystallization. Heat and thermo-chemical treatment. Transformations during heating and cooling of iron alloys. CTP charts. Hardenability of steel. Annealing of steel, volume and surface hardening, carburizing, nitriding. Technical non-ferrous metal alloys. Copper and its alloys. Light metals and their alloys. Zinc and its alloys. Bearing alloys. Nickel, titanium and cobalt alloys. Low-melting alloys. Ceramic materials - classification, properties, production. Polymer materials - division, properties, production. Composite construction materials - division, properties, production. Biomimetics. Trends in material development.</p> <p>Laboratory</p> <p>Metallography. Fe-Fe3C phase equilibrium system. Unalloyed steels in the annealed condition. Foundry iron alloys. Hardening and tempering. Corrosion-resistant steels. Tool steels. Non-ferrous alloys.</p>		
Prerequisites and co-requisites			

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium	50.0%	50.0%
	Passing laboratory	50.0%	50.0%
Recommended reading	Basic literature	M. Głowacka A. Zieliński: Podstawy Materiaoznawstwa. WPG Gdańsk 2014  M. Blicharski: Stal WNT Warszawa 2019  K. Przybyłowicz Metaloznawstwo WNT Warszawa 2007	
	Supplementary literature	M. Ashby Materiały Inżynierskie t.1 i 2 WNT Warszawa 1995  M. Ashby Inżynieria Materiałowa t. 1 i 2 Galaktyka Łódź 2011	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Metal structure. The structure of metals. Crystal networks. Properties of materials. Equilibria systems. Basics of heat treatment.		
Work placement	Not applicable		

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