



Subject card

Subject name and code	Specialty construction materials, PG_00039737						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group 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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Materiałoznawstwa I Technologii Materiałowych -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Dionizy Czekaj				
	Teachers		dr hab. Agata Lisińska-Czekaj				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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	1.0		19.0	50	
Subject objectives	To introduce students to selected topics in materials science and engineering.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U06	Students will be able to use scientific databases, obtain relevant information and critically analyse their usefulness for the realisation of a selected engineering problem.			[SU2] Assessment of ability to analyse information		
	K6_K01	The student understands the need to improve professional competences			[SK2] Assessment of progress of work		
	K6_W07	The student has knowledge of the structure and basic properties of construction materials			[SW1] Assessment of factual knowledge		
	K6_W06	Student knows the basic methods of forming engineering materials			[SW1] Assessment of factual knowledge		
Subject contents	LECTURE Materials in modern engineering. Classification of materials. Atomic structure of materials. Crystal structure, simple ideas of crystallography. Mechanical properties of structural materials. Electrical properties, electrical resistance of metals. Electrical conductivity of semiconductors. Magnetic properties, magnetic hysteresis loop. Optical properties, thermal properties. Structure, properties and application of ceramic materials. Classification of ceramic materials, technology of ceramic materials. Microstructure of ceramics and its influence on properties. General characteristics of the structural properties of ceramic materials, mechanical properties of ceramics. Production and shaping of ceramics, major types of technical ceramics. Special ceramics. Structural nanomaterials. Fibrous and aggregate composites. Gradient materials, TBC materials. Technology of structural materials. LABORATORY Characteristics of chromium-molybdenum steel products in as-received conditions. Examinations of technical state of chromium-molybdenum steel products after long-term exploitation in elevated temperature. Assessment of technical state of 5Cr-0,5Mo steel tubes for elements of heat exchanger. Assessment of pack aluminizing process quality of 9Cr-1Mo steel tubes. Characteristics of chromium-nickel austenitic steel state by means of light microscopy and transmission electron microscopy examinations.						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium	51.0%	60.0%
	Laboratory classes	100.0%	40.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. M. Blicharski., Wstęp do inżynierii materiałowej, Wydawnictwo Naukowo Techniczne, Warszawa 2001 2. M. Blicharski, Inżynieria materiałowa, Wydawnictwo Naukowo Techniczne, Warszawa 2014; 3. L. A.Dobrzański , Podstawy nauki o materiałach i metaloznawstwo. Materiały inżynierskie z podstawami projektowania materiałowego., WNT Warszawa, 2002 4. M. Kaczorowski, A. Krzyńska, Konstrukcyjne materiały metalowe, ceramiczne i kompozytowe, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2017 5. A. Boczkowska, G.Krzesiński, Kompozyty i techniki ich wytwarzania, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2016 6. M.Ashby, H.Shercliff, D.Cebon, Inżynieria materiałowa, T1, T2, Wydawnictwo Galaktyka, Łódź, 2011 7. M.Ashby, D.Jones, Materiały inżynierskie; właściwości i zastosowania, T1, Wydawnictwa Naukowo-Techniczne, Warszawa, 1995 8. M.Ashby, D.Jones, Materiały inżynierskie; kształtowanie struktury i właściwości, dobór materiałów, T2, Wydawnictwa Naukowo-Techniczne, Warszawa, 1996 9. M. Głowacka, J. Łabanowski, Inżynieria powierzchni. Wybrane zagadnienia. Wydawnictwo PWSZ w Elblągu, Elbląg 2014 10. M. Głowacka (Red), Metaloznawstwo, Wydawnictwo Politechniki Gdańskiej, Gdańsk 1996 (skrypt) 11. M. Głowacka, A. Zieliński (Red), Podstawy materiałoznawstwa, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011 (skrypt) 12. J. Hucińska (Red), Metaloznawstwo. Materiały do ćwiczeń laboratoryjnych, Wydawnictwo Politechniki Gdańskiej, Gdańsk 1995(skrypt) 13. Kurzydłowski K., Lewandowska M., Nanomateriały inżynierskie, konstrukcyjne i funkcjonalne, PWN, Warszawa, 2010 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Michael Ashby, Hugh Shercliff and David Cebon, Materials Engineering, Science, Processing and Design, Elsevier Ltd, 2007 2. Michael Ashby, David Jones, Engineering Materials 1, An Introduction to Properties, Applications, and Design, Elsevier Ltd, 2012 3. Michael Ashby, David Jones, Engineering Materials 2, An Introduction to Microstructures and Processing, Elsevier Ltd, 2013 4. W. D. Callister, Jr., Materials science and engineering, an introduction, 7th ed., Wiley, 2007, 5. A.J. Moulson, , J.M. Herbert, Electroceramics, Materials Properties and Applications, Chapman and Hall, 1990 6. R. Pampuch, An Introduction to Ceramics, Springer International Publishing Switzerland, 2014 	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Materiały konstrukcyjne specjalne, L, sem.06, letni 23/24 - Moodle ID: 37889 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37889</p> <p>Materiały konstrukcyjne specjalne, L, sem.06, letni 23/24 - Moodle ID: 37889 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37889</p>	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Mechanical properties of structural materials 2. Electrical resistance of ceramics 3. Refractory engineering materials 4. Fabrication of ceramics 5. Structural nanomaterials 		
Work placement	Not applicable		