



## Subject card

Subject name and code	Modern engineering materials, PG_00039594						
Field of study	Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
Education level	second-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			2.0		
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	dr hab. inż. Łukasz Piszczyk					
	Teachers	dr hab. inż. Łukasz Piszczyk dr inż. Marcin Włoch dr inż. Paulina Kosmela dr inż. Ewa Głowińska					
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	10.0		10.0	50	
Subject objectives	Obtaining basic knowledge in the field of modern construction materials and their behavior under the influence of the environment						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_W03	has in-depth knowledge and knows how to apply it			[SW3] Assessment of knowledge contained in written work and projects		
	K7_K01	understand need for continuous education			[SK4] Assessment of communication skills, including language correctness		
	K7_U02	has required abilities			[SU2] Assessment of ability to analyse information		
	K7_W07	has proper knowledge			[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	<p>ecture: Principles and criteria for the selection of metal materials. Weldable steels with increased and high endurance. Maraging steels. Steels for car body sheets. Corrosion-resistant steels and acid-resistant: austenitic and ferritic-austenitic "duplex" steels and superalloys resistant to corrosion. Steels for operation at elevated temperatures. Heat-resistant and creep-resistant steels. Heat-resistant superalloys based on iron, nickel and cobalt, for power turbines and aircraft engines and the petrochemical and chemical industries. High-melting metals and their alloys: molybdenum, niobium, tungsten, rhenium, tantalum, zirconium and hafnium. Superplastic alloys. Micromachines and materials used in them. Materials for nuclear energy. Materials with the structure of intermetallic phases.</p> <p>Laboratory exercise: Weldable steels of increased and high strength. High-alloy steels corrosion resistant. Steels for operation at elevated temperatures. Metal materials for energy.</p>						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture - essay /exam	50.0%	50.0%
	Laboratory	50.0%	50.0%
Recommended reading	Basic literature	<p>1. Adamczyk J., Szkaradek K.: Materiały metalowe dla energetyki jądrowej. Wyd. Politechniki Śląskiej, Gliwice 1992. 2. Ashby M., Jones D.: Materiały inżynierskie. Tom I właściwości i zastosowanie. WNT, Wwa 1995. 3. Ashby M., Jones D.: Materiały inżynierskie. Tom II Kształowanie struktury i właściwości, dobór materiałów. WNT, W-wa 1996. 4. Baczkowska A. i in.: Kompozyty. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 2000. 5. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, Warszawa 2003. 6. Blicharski M.: Inżynieria materiałowa. Stal. WNT, Warszawa 2004. 7. Chodorowski J., Ciszewski A., Radomski T.: Materiałoznawstwo lotnicze. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 1996. 8. Ciszewski B., Przetakiewicz W.: Nowoczesne materiały w technice. Wyd. Bellona, Wwa 1993</p>	
	Supplementary literature	<p>1. Mikułowski B.: Stopy żaroodporne i żarowytrzymałe. Wyd. Akademii Górniczo-Hutniczej, Kraków 1997. 2. Oczko K.: Kształowanie ceramicznych materiałów technicznych. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 1995. 3. Pampuch R.: Siedem wykładów o ceramice. Wyd. Akademii Górniczo-Hutniczej, Kraków 2001. 4. Śledziona J.: Podstawy technologii kompozytów. Wyd. Politechniki Śląskiej, Gliwice 1998.</p>	
	eResources addresses	<p>Adresy na platformie eNauczanie: Współczesne materiały inżynierskie - Moodle ID: 38340 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38340">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38340</a></p>	
Example issues/ example questions/ tasks being completed	1. Aviation materials 2. materials for the energy sector 3. MEMS		
Work placement	Not applicable		