



## Subject card

Subject name and code	Advanced engineering materials, PG_00064822						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
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			English		
Semester of study	1	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Division of Materials Science and Technology -> 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 hab. inż. Agnieszka Ossowska dr inż. Krzysztof Krzysztofowicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
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	45	16.0		39.0	100	
Subject objectives	Obtaining the basic knowledge on the advanced construction materials and its behavior in various environments						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U12] develops her/his own potential and independently plans own, lifelong learning, while also being able to guide others in this regard	student explains importance of continuous learning			[SU2] Assessment of ability to analyse information		
	[K7_W04] demonstrates knowledge covering selected topics of advanced specific knowledge, in particular methods, techniques, tools specific to Mechanics and Mechanical Engineering processes, systems and equipment	the student demonstrates knowledge of selected problems related to the use of materials			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U01] utilizes information obtained from the literature and other sources in the field of Mechanics and Mechanical Engineering and presents and analyses the results of solutions to technical problems in this field	the student demonstrates the ability to obtain and analyze information from various sources			[SU2] Assessment of ability to analyse information		

Subject contents	<p>LECTUE: Rules and criteria for metallic materials selection. Weldable increased and high strength steels. Maraging steels. Steels for automotive body sheets. Corrosion resistant and acid resistant steels: austenitic and duplex type ferritic-austenitic, corrosion resistant superalloys. Steels for elevated temperatures application.</p> <p>Heat resistant and high-temperature creep resistant steels. High-temperature creep resistant iron, nickel and cobalt superalloys for power generation turbines, aviation turbines, petrochemical and chemical industry.</p> <p>Refractory metals and alloys: molybdenum, niobium, rhenium, tantalum, zirconium and hafnium. Superplastic materials. MEMS and materials used in it. Materials for nuclear power generation. High entropy materials and alloys (HEM).</p> <p>LABORATORY: Weldable increased and high strength steels. High alloying corrosion resistant steels. Materials for high temperature applications. Composites.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;">Subject passing criteria</th> <th style="width:33%;">Passing threshold</th> <th style="width:33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Laboratory</td> <td>50.0%</td> <td>35.0%</td> </tr> <tr> <td>Preparation of essay</td> <td>50.0%</td> <td>35.0%</td> </tr> <tr> <td>Egzamin</td> <td>50.0%</td> <td>30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory	50.0%	35.0%	Preparation of essay	50.0%	35.0%	Egzamin	50.0%	30.0%
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	Preparation of essay	50.0%	35.0%												
Egzamin	50.0%	30.0%													
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Adamczyk J., Szkaradek K.: Materiały metalowe dla energetyki jądrowej. Wyd. Politechniki Śląskiej, Gliwice 1992.</li> <li>2. Ashby M., Jones D.: Materiały inżynierskie. Tom I właściwości i zastosowanie. WNT, W-wa 1995.</li> <li>3. Ashby M., Jones D.: Materiały inżynierskie. Tom II Kształtowanie struktury i właściwości, dobór materiałów. WNT, W-wa 1996.</li> <li>4. Baczkowska A. i in.: Kompozyty. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 2000.</li> <li>5. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, Warszawa 2003.</li> <li>6. Blicharski M.: Inżynieria materiałowa. Stal. WNT, Warszawa 2017.</li> <li>7. Chodorowski J., Ciszewski A., Radomski T.: Materiałoznawstwo lotnicze. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 1996.</li> <li>8. Ciszewski B., Przetakiewicz W.: Nowoczesne materiały w technice. Wyd. Bellona, W-wa 1993.</li> <li>9. Cantor B., Assender H., Grant P.: Aerospace Materials. IoP, Bristol and Philadelphia 2001</li> </ol>													
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Oczóś K.: Kształtowanie ceramicznych materiałów technicznych. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 1995.</li> <li>2. Pampuch R.: Siedem wykładów o ceramice. Wyd. Akademii Górniczo-Hutniczej, Kraków 2001.</li> <li>3. Śledziona J.: Podstawy technologii kompozytów. Wyd. Politechniki Śląskiej, Gliwice 1998.</li> </ol>													
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Advanced engineering materials, W, IDE, sem.1, letni, 2024/25 - Moodle ID: 44419  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44419">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44419</a></p> <p>Advanced engineering materials, L, IDE, sem.1, letni, 2024/25 - Moodle ID: 44420  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44420">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44420</a></p>													
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Aerospace materials</li> <li>2. Materials for power generation</li> <li>3. MEMS</li> </ol>														
Work placement	Not applicable														

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