



## Subject card

Subject name and code	Modelling in machine design, PG_00057368						
Field of study	Mechanical 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			4.0		
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	dr inż. Michał Landowski					
	Teachers	dr inż. Michał Landowski dr inż. Krzysztof Krzysztofowicz dr inż. Artur Sitko dr inż. Gabriel Strugała mgr inż. Krzysztof Emilianowicz					
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	8.0		47.0	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_W04] possesses specialized knowledge on design, construction, properties and testing methods of construction materials	has specialist knowledge			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U08] is able to design a procedural equipment or device compliant with the specifications using a design aid system in the form of a design documentation, selecting the appropriate model, performing critical analysis with the proper selection of tools and technologies	able to do critical analysis			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_U06] when solving engineering problems on design, technology and operation of machines is able to assess and classify typical methods and tools, define systemic and ex-technical aspects using modern calculating methods and design tools or modifying the current ones	able to evaluate and classify			[SU2] Assessment of ability to analyse information		

Subject contents	<p>LECTURE: 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. 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	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	50.0%	30.0%
	essay	50.0%	35.0%
	exam	50.0%	35.0%
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 2004.</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. Mikułowski B.: Stopy żaroodporne i żarowytrzymałe. Wyd. Akademii Górniczo-Hutniczej, Kraków 1997.</li> <li>2. Oczóś K.: Kształtowanie ceramicznych materiałów technicznych. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 1995.</li> <li>3. Pampuch R.: Siedem wykładów o ceramice. Wyd. Akademii Górniczo-Hutniczej, Kraków 2001.</li> <li>4. Śledziona J.: Podstawy technologii kompozytów. Wyd. Politechniki Śląskiej, Gliwice 1998.</li> </ol>	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Zaawansowane materiały inżynierskie, PG_00057368, W, MiBM, 2 st., sem. 01, letni 23/24 - Moodle ID: 37834  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37834">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37834</a></p> <p>Zaawansowane materiały inżynierskie, PG_00057368, L, MiBM, 2 st., sem. 01, letni 23/24 - Moodle ID: 37835  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37835">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37835</a></p>	

Example issues/ example questions/ tasks being completed	1. Aerospace materials 2. Materials for power generation 3. MEMS
Work placement	Not applicable

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