GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Structural Materials, PG_00042019		
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2020/2021
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	English
Semester of study	2	ECTS credits	4.0
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 inż. Krzysztof Krzysztofowicz	
	Teachers	dr hab. inż. Jacek Tomków 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

Adresy na platformie eNauczanie:

Structural Materials - Laboratory, Energetyka, Energy Technologies, Ist, sem 02 - Nowy - Moodle ID: 10477
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10477

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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	7.0	48.0	100

Subject objectives

Providing students with a general knowledge of materials science and material technologies necessary for an engineer in the field of Power Engineering

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W04	The student defines the basic groups of construction materials. The student explains the differences in mechanical properties and physical materials construction depending on chemical composition and structure.	[SW1] Assessment of factual knowledge
K6_U02	The student selects the right ones construction materials for suitable applications. The student knows the methods of shaping mechanical properties metallic structural materials	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>LECTURE Structure of materials. Characteristics of the main groups of materials. Metals. Ceramic materials. Polymers. Composite materials. Principles of selection of engineering materials in machine building. Crystalline structure of materials. Crystal structure defects. Polymorphism. Crystallization of metals and alloys. Properties mechanical materials. Materials testing methods. Working conditions and mechanisms of material consumption engineering. Metal alloys. Strengthening metals and alloys, phase transitions. Phase equilibrium systems. Solid state transformations. Iron-carbon phase equilibrium system. Division and classification of steel. Constant construction. Steels with special properties - corrosion-resistant steels, heat-resistant and heat-resistant steels. Foundry iron alloys. Cast steel and cast iron. Shaping the structure and properties of engineering materials technological methods. Plastic, thermal and thermo-chemical treatment. Annealing, hardening, carburizing, nitriding. Technical non-ferrous metal alloys. Copper and its alloys. Light metals and their alloys. Metal materials for energy. Ceramics and glass. Properties of ceramic materials. Methods of producing and shaping ceramic materials. Polymer materials. Structure of polymers. Thermoplastic polymers. Thermosetting polymers. Elastomers. Processing of polymers. Properties polymers. Composite materials.

LABORATORY Metallographic tests. Crushing and recrystallization of metals. Phases and ingredients structural alloys of iron with carbon. Iron casting alloys. Alloy and unalloyed steels. Hardening and tempering of steel.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory - passing</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Colloqium</td><td>50.0%</td><td>50.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Askeland. D, Phules P.: The science and engineering of materials. Thomson 2008</td></tr>
<tr><td>Supplementary literature</td><td>Srivastava C.M, Srinivasan C: Science of engineering materials.New Age Publishers 2005</td></tr>
<tr><td>eResources addresses</td><td>Structural Materials - Laboratory, Energetyka, Energy Technologies, Ist, sem 02 - Nowy - Moodle ID: 10477
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10477
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Material groups

Crystal networks

The influence of carbon content on the mechanical properties of steel</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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