GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Basic of Materials Engineering II, PG_00039791 | | |
| Field of study | Materials Engineering, Materials Engineering, Materials Engineering | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | 2022/2023 |
| Education level | first-cycle studies | Subject group | Obligatory subject group in the field of study<br>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 | 2 | Language of instruction | Polish |
| Semester of study | 3 | ECTS credits | 6.0 |
| Learning profile | general academic profile | Assessment form | exam |
| 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. Grzegorz Gajowiec | |
| | Teachers | dr inż. Grzegorz Gajowiec<br>dr inż. Łukasz Pawłowski | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 0.0 | 45.0 | 0.0 | 0.0 | 60 |

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 | 60 | 15.0 | 75.0 | 150 |

**Subject objectives**

To acquaint students with issues related to the features and application of iron alloys and their heat and thermo-chemical treatment.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_U01 | Can assess the microstructures and make the necessary calculations. | [SU3] Assessment of ability to use knowledge gained from the subject |
| K6_K01 | He is aware of the difficulties involved in analyzing microstructures. | [SK2] Assessment of progress of work |
| K6_W03 | Based on the observation of the microstructure, the student can recognize the type of steel and the type of processing it has been subjected to. | [SW1] Assessment of factual knowledge |
| K6_W06 | He can prepare metallographic specimens and assess their microstructure | [SW1] Assessment of factual knowledge |

**Subject contents**

Iron-carbon alloys - types. Characteristics and application of white and graphite cast irons. Classification, marking and application of non-alloy and alloy steels. Heat treatment of steels - annealing, hardening and tempering. Issues of hardenability and its importance. The influence of alloying elements on the properties of steel. Characteristics of structural, corrosion-resistant and tool steel alloys. Heat and chemical treatment of steel.

**Prerequisites and co-requisites**

Completion of the Fundamentals of Materials Science course I.

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| credit laboratory and written exam | 75.0% | 100.0% |

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| Recommended reading | Basic literature | 1.Podstawy materiałoznawstwa po redakcją M. Głowackiej i A. Zielińskiego, wydawnictwo PG, Gdańsk 2014<br><br>2. Głowacka M. (red.). Metalozawstwo, Politechnika Gdańska, Gdańsk, 1996 |
| | Supplementary literature | 1. Ashby F.A., Jones D.R.: Materiały inżynierskie. Tom I i II. WNT, Warszawa, 1995.<br>2. Callister W.D.: Materials Science and Engineering. Wiley and Sons, 2000-2006.<br>3. Dobrzański L.A.: Metalowe materiały inżynierskie. WNT, Warszawa, 2004.<br><br>4. Ashby F.A., Shercliff H., Cebon D.: Inżynieria materiałowa. Tom 1 i 2. Galaktyka 2011 |
| | eResources addresses | Adresy na platformie eNauczanie:<br>Podstawy Inżynierii Materiałowej II, W, IM, sem. 03, zimowy 22/23 - Moodle ID: 26338<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26338 |
| Example issues/ example questions/ tasks being completed | [1]. Definition of steel and classification criteria.<br>[2] How does the eutectoid transformation affect the grain size in steel?<br>[3] How alloying additives affect:<br>- steel structures<br>- hardenability of steel<br>- steel resistance to corrosion?<br>[4] Definition of cast iron. How does the form of coal occurrence affect the properties of cast irons?<br>[5] What is cast iron, according to what criteria can it be classified.<br>[6] What are ductile cast irons characterized by and where are they used.<br>[7]. What is heat treatment and what are its basic types.<br>[8] What is the hardenability of steel, what factors and how do they affect it, and what is its practical significance?<br>[9] What structures are obtained after hardening the steel. What are they characterized by?<br>[10] Explain the terms:<br>-critical hardening speed<br>- critical diameter D50 and D90. | |
| Work placement | Not applicable | |