



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials Science

Course

Field of study

Safety Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Ph.D., Eng., Piotr Dziarski

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Faculty of Materials Engineering and Technical

Physics

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Responsible for the course/lecturer:

Prerequisites

Student has a basic knowledge of chemistry, physics and mathematics. Student can think logically, associates the image with the description. Student understands the need to learn and acquisition knowledge, systematic learning.

Course objective

Understanding the relationship between chemical composition, physical properties and material microstructure in combination with heat treatment, thermo-chemical treatment and plastic forming.

Course-related learning outcomes

Knowledge



The student knows issues related to engineering issues (physics, chemistry, materials science, manufacturing technologies, strength of materials, mechanics) [P6S_WG_01]

Skills

The student is able to properly select the sources and information derived from them, making the evaluation, critical analysis and synthesis of this information [P6S_UW_01]

The student is able to present the problem falling within the scope of safety engineering by appropriately selected methods [P6S_UK_01]

The student is able to identify changes in requirements, standards, regulations and technical progress and the reality of the labor market, and on their basis determine the need for supplementing knowledge [P6S_UU_01]

Social competences

The student is aware of the understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made [P6S_KK_03]

The student is aware of responsibility for their own work and readiness to comply with the rules of teamwork and responsibility for jointly performed tasks [P6S_KR_02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment:

- a. In the range of laboratory, on the basis of oral responses with each exercise.
- b. In the range of lectures, on the basis of two tests during the semester.

Collective assessment:

- a. In the range of laboratory, average of grades obtained in the exercise.
- b. In the range of lectures - test/oral exam.

Programme content

Lecture:

Classification, types of materials and their use. Important properties of materials. Factors influencing the properties of materials. Methods and techniques of materials properties modification. Classification of metals and alloys. Phase equilibrium diagrams of metal alloys. Types, microstructure and properties of phases in metal alloys. Iron alloy - microstructure, properties and their modifications, destiny. Copper alloys. Aluminum alloys. Titanium alloys. Ceramics - types, microstructure, properties and uses. Plastics - types, microstructure, properties and uses. Composites - types of structure and properties. Heat treatment and thermo-chemical treatment. Importance, types and properties of the surface layers.

Laboratory:



1. Structural steels -deliver state 2. Constructional steels after heat treatment 3. Structure and properties of steel after thermo-chemical treatment 4. Tool steels 5. Cast iron and cast steel 6. Copper and copper alloys 7. Aluminum alloys 8. Surface layers 9. Composites 10. Causes for premature were of machines elements and tools.

Teaching methods

Lecture: multimedial presentation ilustrated by the examples presented on the board

Laboratory: practical laboratory

Bibliography

Basic

M. Blicharski " Inżynieria Materiałowa" Warszawa, WNT, 2017

L. A. Dobrzański "Metale i ich stopy : podręcznik akademicki do nauki metaloznawstwa i inżynierii materiałowej " International OCSCO World Press, 2017

L.A. Dobrzański " Podstawy Nauki o Materiałach" Wydawnictwo Politechniki Śląskiej (Gliwice), 2013

L. A. Dobrzański "Metaloznawstwo opisowe stopów żelaza ", Wydawnictwo Politechniki Śląskiej (Gliwice), 2007

L. A. Dobrzański "Metaloznawstwo opisowe stopów metali nieżelaznych ", Wydawnictwo Politechniki Śląskiej (Gliwice), 2008

M. Blicharski " Wstęp do inżynierii Materiałowej" Warszawa, WNT, 1998

Additional

K. Przybyłowicz "Metaloznawstwo" Warszawa WNT 1999

A. Barbacki " Materiały w Budowie Maszyn" - WPP 2006

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	30	1,0

¹ delete or add other activities as appropriate