



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials Science

### Course

Field of study

Year/Semester

Safety Engineering

1/2

Area of study (specialization)

Profile of study

-

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

15

0

Tutorials

Projects/seminars

0

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr inż. Piotr Dziarski

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tel. 061 665 35 73

Wydział Inżynierii Materiałowej i Fizyki

Technicznej

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

1. Student knows the basic engineering materials groups.

2. Student knows the basic mechanical, physical and chemical properties of material.



### Skills

1. Student can evaluate the structure and properties of materials on the basis of phase equilibrium diagrams.
2. Student can propose appropriate heat treatment of ferrous alloys.

### Social competences

1. Student is aware of the importance of materials properties in economy.
2. Students can cooperate in a group.

### 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 wear of machines elements and tools.

### Teaching methods

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

Laboratory: practical laboratory



## Bibliography

### Basic

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

L. Dobrzański "Podstawy Nauki o Materiałach i Metaloznawstwo" Warszawa WNT 2002

### 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	1,8
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	1,2

<sup>1</sup> delete or add other activities as appropriate