COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials Science - materials properties and application

Course

Field of study

Engineering management

Year/Semester

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Prof. Jarosław Jakubowicz, Ph.D., D.Sc., Eng.,

Mail to: jaroslaw.jakubowicz@put.poznan.pl

Faculty of Materials Engineering and Technical Physics

ul. Jana Pawła II nr 24, 61-139 Poznań

Responsible for the course/lecturer:

Prerequisites

Students should have a basic knowledge of physics and chemistry. They should also have the ability to think logically and to obtain information from various sources as well as be ready to cooperate within a team. In addition, they should understand the need to learn and acquire new knowledge

Course objective

Providing to students information about basic groups of engineering materials, their properties, methods of properties design, materials application and the basics of materials management.

Course-related learning outcomes

Knowledge

The student names and describes the classification of engineering materials and their physicochemical properties [P6S_WG_14].

The student defines concepts related to the structure of materials, such as crystalline structure and defects in crystalline structure [P6S_WG_17].

The student describes key engineering materials, including metals, polymers, ceramics, and composites, as well as their properties and applications [P6S_WG_17].

Skills

The student explains and interprets the relationships between the structure and properties of engineering materials [P6S_UW_09].

The student plans and conducts experiments, including measurements and computer simulations, and interprets the results in the context of materials science [P6S_UW_09].

The student recognizes and identifies design tasks related to the construction and operation of machines and solves simple design problems in this field [P6S_UW_14].

Social competences

The student is aware of the impact of material selection on the economy, engineering, marketing, law, and organizational aspects in the product creation process [P6S_KO_02].

The student is conscious of the importance of non-technical and ecological aspects in engineering activity and the responsibility for the decisions made [P6S_KR_01].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1) Knowledge acquired during the lectures is verified at the final test lasting 45 minutes. There are two credit deadlines in the May / June of the summer semester to which every student is entitled. In addition, students can improve their grades in September. Final test consists of 5-10 questions. The pass threshold is 50% of the points.
2) Skills acquired as part of the laboratory classes are checked on an ongoing basis during each class in the form of an oral or written answer to the questions asked and assessed on the basis of reports from each laboratory exercise. Each laboratory exercise requires a positive evaluation. At the end of the semester, after completing 5 compulsory exercises, there is a possibility to pass a corrective exam of selected exercises

Programme content

Lecture:
1) Classification of engineering materials.
2) Physicochemical properties of materials.
3) Materials management, selection of materials.
4) Structure of materials, interatomic bonds, crystal structure, crystal structure defects and their influence on properties.

5) Equlibrium phase diagram of iron alloys.
6) Methods of the structure and properties of materials design.
7) Metals and metal alloys (cast iron alloys, steels, aluminum alloys, copper alloys, titanium alloys), their properties and applications.
8) Polymers; properties and application.
9) Ceramics; properties and application.
10) Composites; properties and application.

Laboratory classes (5 exercises chosen by the teacher):
1) Steels in delivery condition.
2) Heat treated steels.
3) Structure and properties of steel after thermo-chemical treatment.
4) Tool steels.
5) Cast iron alloys.
6) Copper and its alloys.
7) Light alloys.
8) Surface layers with special properties.
9) Composite materials.
10) Causes of premature wear of machine parts and tools.

Teaching methods

1) Lecture: multimedia presentation, illustrated with examples on the board.
2) Laboratory exercises: microscopic observations; performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1) WILLIAM D. CALLISTER, JR. FUNDAMENTALS OF MATERIALS SCIENCE AND ENGINEERING / AN INTERACTIVE; http://www.wiley.com/college/callister
2) L. Dobrzański, „Metaloznawstwo z podstawami nauki o materiałach”, WNT Warszawa.
3) K. Przybyłowicz, „Materiałoznawstwo”, WNT Warszawa.

4) skrypt PP pod red. A. Barbackiego „Materiały w budowie maszyn”, wyd. PP.
5) red. A. Barbacki „Materiały w budowie maszyn”, wyd. PP.

Additional

1) red. A. Barbacki „Metaloznawstwo dla mechaników”, wyd. PP.
2) A. Ciszewski, T. Radomski „Materiały konstrukcyjne w budowie maszyn”, PWN Warszawa
3) M. Blicharski „Wstęp do inżynierii materiałowej”, WNT Warszawa

Breakdown of average student's workload

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

[1] delete or add other activities as appropriate