COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of materials science

Course

Field of study

Biomedical engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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tel. 61 665 35 75

Faculty of Materials Engineering and Technical Physics

Responsible for the course/lecturer:

Prerequisites

1. Knowledge: Basic knowledge of chemistry, physics

2. Skills: Logical thinking, use of the information obtained from the library and the Internet

3. Social competences: Understanding the need for learning and acquiring new knowledge

Course objective

To know the nature, methods of manufacture, the structure and properties of materials

Course-related learning outcomes

Knowledge

1. The student has a systematic general theoretical knowledge covering the key issues from the scope of the materials science.

2. The student knows basic methods, techniques, tools and materials used during the solution of simple enginnering tasks in biomedical engineering.

Skills

1. The student can obtain information concerning materials engineering from literature, databases and other properly selected sources (also in English).

2. The student has the ability to self-study.

Social competences

1. The student understands the need of the learning by the whole life; can inspire and organize the learning of others.

2. The student is aware of importance and understanding the differents aspects and effects of engineering activity, including its impact on the environment and the associated responsibility for decisions.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Ranking based on written examination consisting of general and test questions (ranking in case of getting at least 51% of points: <51% 2 - ndst, 51%-62% 3 - dst, 63%-72% 3,5 - dst+, 73%-83% 4 - db, 84%-94% 4,5 - db+, > 94% 5 - bdb) written for the end of the semester.

Tutorials: Passing on the basis of oral and written answers (pass if you get at least 51% of points.

Programme content

Lecture:

1. Classification and characterization of materials: metals, polymers, ceramics, composites.

2. Other categories of classification of materials: structural, functional, ecomaterials, biomaterials

3. Structure of the materials in the macro, micro and nano scale.

4. Bonds, the crystal structure.

5. Defects of crystalline materials: spotlights, linear, spatial.

6. The most important material properties: physical, chemical, mechanical, technological, performance tests.

7. Basic methods for measuring the properties of materials.

8. Fundamentals of thermodynamics and diffusion in materials.

9. Phase equilibrium systems, metal alloys, phases, solutions.

10. Mechanism of crystallization.

11.Characteristics of phase transformations and their classification.

Tutorials:

1. Atomic structure and basic classification of materials.

2. Crystal structure, crystallographic system, basics of indexing.

3. Calculating and analyzing the mechanical, technological and exploitational properties of materials.

4. Analyzing the structure of materials and determining its influence on properties.

5. Interpretation of typical 2-component phase equilibrium systems: systems with unlimited solubility of components in the solid state, systems for components that are not mutually dissolving in the solid state, systems with eutectic transformation when the components dissolve in the solid state

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

Tutorials: problem solving, practical exercises, discussion, team work.

Bibliography

Basic

1. Blicharski M. Wstęp do inżynierii materiałowej. WNT, Warszawa, 2003.

2. Przybyłowicz K. Metaloznawstwo, WNT, Warszawa, 2007.

Additional

1. Dobrzański L. Podstawy nauki o materiałach i metaloznawstwo. WTN, Warszawa, 2002.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	62	2,5
Student's own work (literature studies, preparation for classes, preparation for exam) [1]	63	2,5

[1] delete or add other activities as appropriate