COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of materials science II

Course

Field of study
Materials Engineering

Year/Semester
2/3

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	
Tutorials	Projects/seminars	
15		

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Faculty of Materials Engineering and Technical Physics

Piotrowo 3 Street, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: basic knowledge of chemistry, physics, materials science. Skills: logical thinking, use of the information obtained from the library and the Internet. Social competencies: understanding the need for learning and acquiring new knowledge.

Course objective

To know the nature, structure, and properties of the materials obtained using different manufacturing technology.

Course-related learning outcomes

Knowledge

1. Student has a systematic general theoretical knowledge covering the key issues from the scope of the materials science. (T1A_W03) K_W08

2. Student has a systematic general theoretical knowledge on engineering materials. (T1A_U01) K_W10

Skills

1. Student can obtain information concerning materials engineering from literature, databases and other properly selected sources (also in English). (T1A_U01) K_U01

2. Student has the ability to self-study. (T1A_U05) K_U05

Social competences

1. Student understands the need of the learning by the whole life; can inspire and organize the learning of others. (T1A_K01) K_K01

2. 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. (T1A_K02, InzA_K01) K_K02

3. Student is able to interact and work in a group, taking in the various roles. (T1A_K03) K_K03

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.

Classes: Ranking based on oral answers and two written tests 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). The average score of the two tests is calculated. Both the tests have to be pass.

Laboratory: Ranking based on an oral answer from the scope of contents of the performed laboratory excersise and report on every laboratory exercise according to indications of the leading the laboratory exercises.The average score of all the laboratory exercises is calculated. All the exercises have to be accepted in respect of oral answer and report.

Programme content

Lecture:

1. Characterization and kinetics of basic transformations and their use for heat treatment of metal alloys.

2. The impact of phase transformation on the evolution of the structure and properties of metal alloys.

3. The plastic deformation of metals, recovery and recrystallization.

4. The mechanisms and methods of strengthening materials.

Classes:

1. Analyzing the iron-cementite equilibrium system and the mechanisms and kinetics of phase transformations.

2. Comparing the structures and properties of alloys with different chemical and phase composition.

3. Describing the phenomena of nucleation in liquid and solid phases, increase in grain size.

4. Properties of materials with regard to the mechanisms for strengthening the various ways.

Laboratory:

1. Macroscopic examinations

2. Analysis of the structures of metal alloys using Fe-Fe3C equilibrium system

3. Microstructures of sinle-phase materials and multiphase materials

4. Modification of metal alloys

5. Phase transformations of steel during heating and cooling

6. Effect of carbon content on the phase composition and the mechanical properties of non-alloy steels

7. Effect of heat treatment on mechanical properties of non-alloy and alloy steels

8. The influence of grain size on the strengthening

9. The role of diffusion in modelling the microstructure of alloys

10. Solidification of metals and its alloys

Teaching methods

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

2. Laboratory: practical use of selected microscopic research techniques, discussion and development of results in the form of a report, formulation of proposals on topics addressed in the classroom, work in the team.

3. Classes: Solving tasks, discussion, case studies.

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.

2. Stanisław Prowans. Struktura stopów. Wydawnictwo Naukowe PWN, Warszawa, 2000

3. Skrypt pod red. A. Barbackiego. Materiały w budowie maszyn, przewodnik do ćwiczeń laboratoryjnych. Wydawnictwo Politechniki Poznańskiej, Poznań, 2005

Breakdown of average student's workload

	Hours	ECTS
Total workload	135	5,0
Classes requiring direct contact with the teacher	75	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	60	2,5

[1] delete or add other activities as appropriate