COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of materials science [S1MiTPM1>PNoM2]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

prof. dr hab. inż. Michał Kulka
michal.kulka@put.poznan.pl

Lecturers

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. The student has structured knowledge of the structure of materials, including key issues in the field of materials science, shaping their properties and methods of their selection, in particular for automotive industry products, and knows the operational problems of automotive products.

Skills:
1. The student is able to obtain information from literature, databases and other properly selected

sources in the field of materials engineering and automotive industry technology, in particular he is able to describe groups of materials used in the automotive industry.

Social competences:
1. The student understands the need for lifelong learning, is able to inspire and organize the learning process of other people.
2. The student is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made.

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)
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

Analysis and characterization of phase transformations occurring in iron alloys and alloys of other metals (titanium, nickel, copper, aluminum) and the possibility of using them in heat treatment to form the properties of these alloys. Mechanisms of plastic deformation and recrystallization. Mechanisms of strengthening engineering materials.

Course topics

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.
Laboratory:
1. Effect of carbon content on the phase composition and the mechanical properties of non-alloy steels
2. Effect of heat treatment on mechanical properties of non-alloy and alloy steels
3. The influence of grain size on the strengthening
4. The role of diffusion in modelling the microstructure of alloys
5. 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.

Bibliography

Basic:
1. Blicharski M., Wstęp do inżynierii materiałowej. WNT, Warszawa, 2003002E
2. Przybyłowicz K., Metaloznawstwo, WTN, 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	100	4,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00