COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of materials science [S1MiTPM1>PNoM1]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
1/1

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

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Lecturers

Prerequisites

Knowledge: basic knowledge of chemistry, physics, 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, methods of manufacture, the structure and properties of materials.

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

Classification and general characteristics of engineering materials, their structure, properties, methods of testing properties, basics of diffusion and thermodynamics in materials, phase equilibrium diagrams, phase transformations.

Course topics

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.
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

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.

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