COURSE DESCRIPTION CARD - SYLLABUS

Course name
Materials science [S1MiBM2>MATER]

Course

Field of study
Mechanical Engineering

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
elective

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr hab. inż. Andrzej Miklaszewski prof. PP
andrzej.miklaszewski@put.poznan.pl

Lecturers

Prerequisites

A student starting this subject should have basic knowledge of physics and chemistry. He should also have the ability to obtain information from indicated sources and be ready to cooperate within a team.

Course objective

Providing students with basic knowledge in the field of materials science, including: classification and characteristics of materials divided into basic groups: metals, polymers, ceramics, composites. Other categories of materials division: structural, functional, ecomaterials, biomaterials. Structures of materials on a macro, micro and nano scale, types of bonds occurring in the structure, network structure and its defects. The most important properties of materials: physical, chemical, mechanical, technological, operational. Basic methods of testing the properties of materials. Basics of thermodynamics and diffusion in materials. Phase equilibrium systems, metal alloys, phases, solutions. Mechanisms of metal crystallization. Characteristics of phase transformations and their classification and methods of shaping the properties of materials.

Course-related learning outcomes

Knowledge:

Has knowledge of materials science with elements of chemistry, including natural and engineering technical materials (comparison of their structure, properties and applications), principles of selecting engineering materials in machine construction, shaping the structure and properties of engineering materials using technological methods, materials testing methods, elements computer-aided material design (CAMD - Computer Aided Materials Design) and material selection (CAMS - Computer Aided Materials Selection), the importance of engineering materials in the construction and operation of machines, obtaining metals and their alloys in metallurgical processes.

Skills:
1. Is able to obtain information from literature, databases and other appropriately selected sources (also in English or another foreign language recognized as the language of international communication) in the field of mechanics and machine construction and other engineering and technical issues consistent with the field of study; is able to integrate the information obtained, interpret it, draw conclusions and formulate and justify opinions.
2. Is able to select engineering materials for applications in mechanics and machine construction.

Social competences:
1. Understands the need for lifelong learning; can inspire and organize the learning process of other people.
2. 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: The knowledge acquired during the lecture is verified as part of the final exam in the form of a test. The test consists of 20-35 questions (open and closed), scored differently. Passing threshold: 50% of points(<50% 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. Laboratory: preparation for laboratory classes - test or oral answer to questions related to the exercise performed. Preparing reports on performed laboratory exercises.

Programme content

1. Iron-carbon equilibrium system
2. Heat treatment of metal materials
3. The importance of phase transformations in steels
4. Plastic processing of metal materials
5. Thermo-chemical treatment of metallic materials
6. Alloys of non-ferrous metals
7. Non-metallic materials

Course topics

none

Teaching methods

multimedia presentation, structure analysis - research, discussion

Bibliography

Basic:
1. Blicharski M. Wstęp do inżynierii materiałowej. WNT, Warszawa, 2003.
2. Przybyłowicz K. Metaloznawstwo, WNT, Warszawa, 2007.
3. Dobrzański L. Podstawy nauki o materiałach i metaloznawstwo. WTN, Warszawa, 2002

Additional:
1. Materiały inżynierskie tom. 1 i 2, Ashby M.F., Jones D.R.H., WNT, 2004.
2. Współczesne materiały konstrukcyjne i narzędziowe, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1996

3. Wybrane metalowe materiały konstrukcyjne ogólnego przeznaczenia, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1997
4. Strukturalne aspekty własności mechanicznych wybranych materiałów, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1998
5. Współczesne materiały konstrukcyjne i narzędziowe, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1996
6. Wybrane metalowe materiały konstrukcyjne ogólnego przeznaczenia, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1997
7. Strukturalne aspekty własności mechanicznych wybranych materiałów, Leda H. , Wydawnictwo Politechniki Poznańskiej, Poznań, 1998

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00