



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials science with chemistry elements [N1MiBM1>NOMzEC1]

Course

Field of study	Year/Semester
Mechanical Engineering	1/1
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
part-time	compulsory

Number of hours

Lecture	Laboratory classes	Other
34	8	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

5,00

Coordinators

Lecturers

Prerequisites

Knowledge: basics of chemistry, physics and mathematics; Skills: the ability to think logically, associating the picture with the description; Social competencies: understanding the need to learn and acquire new knowledge, regularity in science

Course objective

Knowledge of the relationship between chemical composition, physical properties and structure of the material in connection with heat, thermochemical and plastic treatments.

Course-related learning outcomes

Knowledge:

1. Student should know a basic groups of engineering materials
2. Student should know a basic mechanical, physical and chemical properties of materials
3. Student should know a basic of the heat treatment and thermochemical treatment

Skills:

1. Student is able to assess the microstructure and properties of materials on the basis of phase equilibrium diagrams
2. Student can suggest a proper heat treatment for the iron alloys

Social competences:

1. Student is able to work in a group
2. Student is aware of the importance of material properties in the economy

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Forming rating:

- a) in the field of laboratory classes based on oral responses from each exercise,
- b) in the field of lectures based on pass conducted during the last lecture classes.

Summary rating:

- a) in the laboratory classes, the average of grades obtained from the exercises,
- b) in the field of lectures - pass in a written form.

Programme content

Lectures:

Classification, types of materials and their purpose. Significant of materials properties. Factors determining the properties of materials. Methods and techniques for modifying the properties of materials. Classification of metals and metal alloys. Phase equilibrium systems of metal alloys. Kinds, microstructure and phase properties of metal alloys. Iron alloys - microstructure, properties and their modification, purpose. Copper alloys. Aluminum alloys. Titanium alloys. Heat and thermochemical treatment.

Laboratory classes:

1. Steels in able of delivery
2. Heat-treated constructional steels
3. Structure and properties of steel after thermochemical treatment
4. Tool steels
5. Cast iron and cast steel
6. Copper and copper alloys
7. Light alloys
8. Surface layers
9. Processes of wear materials
10. Composites

Course topics

none

Teaching methods

Lecture: multimedia presentation, examples of samples after various processes, discussion

Laboratory: practical exercises, discussion

Bibliography

Basic

1. Dobrzański L. A.: Podstawy nauki o materiałach i metaloznawstwo, WNT, Warszawa, 2002
2. Przybyłowicz K.: Metaloznawstwo. WNT, Warszawa, 1999
3. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, Warszawa, 1998
4. Barbacki A.: Materiały w budowie maszyn. Praca zbiorowa, Wydawnictwo Politechniki Poznańskiej, Poznań, 2006
5. Ashby M.F., Jones D.R.H.: Materiały inżynierskie t. 1 i 2, WNT, Warszawa, 1995, 1996

Additional

1. Burakowski T., Wierzchoń T.: Inżynieria powierzchni metali. WNT, Warszawa, 1995
2. Leda H.: Współczesne materiały konstrukcyjne i narzędziowe. Wydawnictwo Politechniki Poznańskiej, Poznań, 1998.
3. Młynarczyk A., Jakubowski J.: Obróbka powierzchniowa i powłoki ochronne. Wydawnictwo Politechniki Poznańskiej, Poznań, 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	84	5,00
Classes requiring direct contact with the teacher	42	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	42	2,50