



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Heat treatment and thermo-chemical treatment [S1IMat1>OCiCC]

Course

Field of study

Materials Engineering

Year/Semester

3/5

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

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr inż. Wojciech Gęstwa

wojciech.gestwa@put.poznan.pl

Lecturers

Prerequisites

The basic from chemistry, physics and science about materials. The logical thinking and use of the information obtained from the library and the Internet. The understanding needs for learning and acquiring new knowledge.

Course objective

It's understanding the kind of thermo-chemical treatment as well as their influence on the structure and properties of metal alloys.

Course-related learning outcomes

Knowledge:

1. the student should name and describe classic and modern kinds of thermo-chemical treatment.

[k_w02, k_w03]

2. the student should characterize material properties depending on the thermo-chemical treatment and heat treatment. [k_w08, k_w11, k_w13]

Skills:

1. the student is able to choose appropriate technology of the thermo-chemical treatment in depending on the required properties of the material. [k_u01, k_u03, k_u05, k_u13]
2. the student is able to offer and choose the device to carry out the thermo-chemical treatment and the heat treatment. [k_u01, k_u05, k_u09]
3. the student is able to design technological process of heat treatment and thermo-chemical treatment selected machine parts or tools. [k_u04, k_u05, k_u08, k_u09, k_u16]

Social competences:

1. the student is active in analyzing and solving problems in a group. [k_k03]
2. the student is aware of the role of heat treatment and surface engineering methods for chemical and thermal processes in the manufacturing technology of products. [k_k02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

The written examination consisting of 5 issues from the scope of the material for lectures (credit in case of correct answer to min. 3 questions; carried out at the semester end).

The grade: $\text{dst} (3.0) \div \text{dst+} (3.5) \Rightarrow 50.1 \div 70\%$; $\text{db} (4.0) \div \text{db+} (4.5) \Rightarrow 70.1 \div 90\%$; $\text{bdb} (5.0) \Rightarrow 90.1 \div 100\%$

Laboratory:

The credit is on the basis of oral or written answers from the scope of the content of each performed laboratory exercises, a report from each laboratory exercise according to the indications leading laboratory exercises.

In order to obtain the credit of laboratories all exercises must be included (the positive response and reports).

Programme content

- 1) The heat treatment - definitions, kinds, methods.
- 2) The technologies of thermo-chemical treatment applied to the iron alloys and non-ferrous alloys.
- 3) The technologies of the simple heat treatment and her correlation with the thermo-chemical treatment
- 4) The devices and the instrumentation, which realized operation of the heat treatment.
- 5) The producibility of elements from the viewpoint of the heat treatment operation.
- 6) The control used in the technologies of heat treatment

Course topics

Lecture:

1. The basic notion from heat treatment.
2. The technologies of thermo-chemical treatment introducing in the top layer of elements such the metallic or non-metallic elements – the selected processes.
3. The heat treatment selected non-ferrous materials.
4. The classification and characteristics of the devices for simple heat treatment and thermo-chemical treatment.
5. The producibility of machines parts or tools from the viewpoint of the heat treatment processing.
6. The control in the simple heat treatment and thermo-chemical treatment processing.
7. The ecology and process of simple heat treatment and thermo-chemical treatment.
8. The influence of thermo-chemical treatment on forming of material properties.
9. The examples process of simple heat treatment and thermo-chemical treatment selected machine elements or tools.

Laboratory:

1. It carrying out the selected processes of thermo-chemical treatment (carburizing, nitriding, boriding) and different variants of the simple heat treatment of ferrous alloys. Part 1, 2 and 3.
2. The control processes of simple heat treatment and thermo-chemical: temperature, time, the chemical composition of atmosphere, carbon potential, nitric potential.
3. The control after processes of simple heat treatment and thermo-chemical treatment: hardness, micro hardness, characteristics of diffusion layer: structure, the thickness layers and phases composition.
4. The design of heat treatment technology cards selected machine parts or tools.

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: performing exercises, discussion, team work.

Bibliography

Basic

1. Burakowski T., Wierzchoń T.: Inżynieria powierzchni metali. WNT, Warszawa, 1995
2. Kula P. Inżynieria warstwy wierzchniej. Monografie. Wyd. Politechniki Łódzkiej, Łódź, 2000
3. Przybyłowicz K. Metaloznawstwo, WTN, Warszawa, 2007

Additional

The current articles connected with the subject matter of the topic.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	35	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00