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 (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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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:

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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: dst (3.0) ÷ dst+ (3.5) => 50.1 ÷ 70%; db (4.0) ÷ db+ (4.5) => 70.1 ÷ 90%; bdb (5.0) => 90.1 ÷ 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

Lecture:
1. The basic notion from heat treatment.
2. The advanced technologies of thermo-chemical treatment introducing in the top layer of machine elements or tools such the chemical elements as: nitrogen, carbon or boron.
3. The heat treatment selected non-ferrous materials.
4. The classification and characteristics of the devices for heat treatment and thermo-chemical treatment.
5. The influence of heat treatment and thermo-chemical treatment on forming of material properties.
6. The producibility of machines parts or tools from the viewpoint of the heat treatment processing.
7. The examples process of heat treatment and thermo-chemical treatment selected machine elements or tools.
8. The control in the heat treatment and thermo-chemical treatment processing.
9. The ecology and process of heat treatment and thermo-chemical treatment.
Laboratory:
1. It carrying out the selected processes of thermo-chemical treatment (carburizing, nitriding, boriding) and different variants of the heat treatment of ferrous alloys. Part 1, 2 and 3.
2. The control processes of heat treatment and thermo-chemical: temperature, time, the chemical composition of atmosphere, carbon potential, nitric potential.
3. The control after processes of 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 and thermo-chemical 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	45	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00