COURSE DESCRIPTION CARD - SYLLABUS

Course name

Heat treatment and welding technology

Course

Field of study

Management and production engineering

Year/Semester

2/3

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

-

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Materials Engineering and technical Physics

Jana Pawła II 24, 61-139 Pozań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of materials science and metal science.

Course objective

Students become familiar with theoretical and practical issues related to heat treatment and thermo-chemical treatment. Understanding basic welding methods and basic methods of pressure welding and thermal cutting.

Course-related learning outcomes

Knowledge

Student characterizes the basic processes of heat and thermo-chemical treatment, welding, pressure welding and thermal cutting processes.

Skills

Student selects heat treatment and thermo-chemical treatment technology, welding, pressure welding and thermal cutting technology with tooling used for production processes.

Student distinguishes typical defects of heat and thermo-chemical treatment processes and welding processes.

Student has basic practical skills in the field of work related to the realization of heat treatment, thermo-chemical and welding processes.

Social competences

Student can individual broaden his knowledge and skills in the field of heat treatment and welding processes.

Student is able to communicate with the employees of the production department in the field of heat treatment and welding processes.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written test at the end of the semester consisting of: open questions and test questions.

Grading scale: <51% 2.0; 51% -64% 3.0; 65% -74% 3.5; 75% -84% 4.0; 85% -94% 4.5; > 94% 5.0

Laboratory: oral or/and written tests based on the content of each laboratory exercise, report of each laboratory exercise as instructed by laboratory instructors. In order to pass the exercises, all of oral or/and written tests and all reports must be counted as positive.

Programme content

Lecture:

1. The basics of heat treatment and thermo-chemical treatment.

2. Technological processes of heat treatment of iron alloys (annealing, hardening, tempering).

3. The hardenability of steel and its importance in heat treatment. Methods of evaluating of steel hardenability.

4. Heat treatment of non-ferrous alloys

5. Technological processes of thermo-chemical treatment (carburizing, nitriding, boronizing, chromizing, laser alloying).

6. The basics of welding processes. Weldability. Construction of the weld. Welded joints. Welding positions.

7. Acetylene-oxygen welding. Arc welding with covered electrodes.

8. Welding in protective gas shields.

Laboratory:

1. Hardenability of steel and heat treatment of iron alloys.

2. Heat treatment of non-ferrous alloys.

3. Thermo-chemical treatment.

4. Gas welding. Thermal cutting: oxygen and plasma.

5. Electric welding with covered electrode and hidden arc welding.

6. Electric welding in gas shields by MAG, MIG and TIG. Resistance and friction welding.

Teaching methods

Lecture: multimedia presentation.

Laboratory: practical exercises, discussion, problem solving.

Bibliography

Basic

1. Praca zbiorowa pod. red. Burakowskiego T.: Obróbka cieplna metali.,SIMP-IMP,Warszawa 1987, tom 1÷7.

2. Burakowski T., Wierzchoń T., Inżynieria powierzchni metali, WNT, Warszawa 1995.

3. Ferenc K., Spawalnictwo, Wyd. Naukowo-Techniczne, Warszawa 2007.

4. Klimpel A., Spawanie, zgrzewanie i cięcie metali. Technologie, WNT, Warszawa 1999.

Additional

1. Kula P., Inżynieria warstwy wierzchniej, Wyd. Poltechniki Łódzkiej, 2000.

2. Moszczyński A., Sobusiak T., Atmosfery ochronne do obróbki cieplnej, WNT, W-wa 1971

3. Myśliwiec M., Cieplno-mechaniczne podstawy spawalnictwa, WNT, Warszawa 1972.

4. Pilarczyk J, Spawanie i napawanie elektryczne metali, Wyd. Śląsk, Katowice 1996.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate