COURSE DESCRIPTION CARD - SYLLABUS

Course name
Heat treatment and welding technology [S1ZiIP2>OCiS]

Course

Field of study
Management and Production Engineering

Year/Semester
1/1

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

Lecturers

Prerequisites

Basic knowledge of materials science and metal science.

Course objective

The aim of the course is to learn about the theoretical and practical issues related to heat treatment and to learn about basic heat and thermo-chemical treatment procedures. To learn the basic methods of welding and the basic methods of welding and thermal cutting.

Course-related learning outcomes

Knowledge:
The student knows the basic terminology of heat treatment and welding technologies.
The student is able to characterize basic heat treatment processes, welding processes and thermal cutting.
The student has knowledge of basic heat treatment, thermo-chemical and welding processes applied to ferrous alloys and non-ferrous alloys.

Skills:
The student is able to apply basic heat treatment and welding procedures to specific groups of materials.

The student is able to select the technology of heat treatment and welding with equipment for production processes.
The student is able to distinguish typical disadvantages of heat treatment and welding processes.
The student has the basic practical skills for the work related to the implementation of heat treatment and welding processes.

Social competences:
The student can independently expand knowledge and skills in heat treatment and welding processes.
The student is able to communicate with 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 colloquium at the end of the semester consisting of: open-ended questions and/or test questions. Credit from 51% of the points. Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.
Laboratory: Credit on the basis of an oral and/or written test on the content of each laboratory exercise performed, a report on each laboratory exercise as indicated by the instructor of the laboratory exercise. All oral and/or written tests and all reports must be passed to receive credit.

Programme content

Basic terminology and definitions applicable to heat treatment and welding.
Technological processes of heat treatment.
Technological processes of thermo-chemical treatment.
Basic welding technologies including gas welding technologies and electric arc welding technologies.

Course topics

Lecture:
1. Fundamentals of heat and thermo-chemical treatment.
2. Technological processes of heat treatment of ferrous alloys (annealing, hardening, tempering).
3. Hardenability of steel and its importance in heat treatment. Methods of assessing the hardenability of steel.
4. Heat treatment of non-ferrous alloys.
5. Technological processes of thermo-chemical treatment.
6. Fundamentals of welding processes. Weldability. Construction of the weld. Welded joints.
7. Acetylene-oxygen welding.
8. Submerged arc welding. Arc welding with covered electrodes. Welding in protective gas shielding.

Laboratory:
1. Hardening of steel and heat treatment of ferrous 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.
6. Gas shielded electric welding by MIG/MAG method.

Teaching methods

Lecture: multimedia presentation.
Laboratory: practical exercises, discussion, solving tasks.

Bibliography

Basic:
1. Burakowski T., Wierzchoń T., Inżynieria powierzchni metali, WNT, Warszawa 1995.
2. Ferenc K., Spawalnictwo, Wyd. Naukowo-Techniczne, Warszawa 2007.
3. Klimpel A., Spawanie, zgrzewanie i cięcie metali. Technologie, WNT, Warszawa 1999.
4. Skrzypek S.J., Przybyłowicz K., Inżynieria metali i technologie materiałowe, PWN, 2019.

5. Assonow A. D., Obróbka cieplna części maszyn, WNT, 1972.
6. Luty, W., Poradnik inżyniera : obróbka cieplna stopów żelaza WNT, 1977.

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	50	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)	20	1,00