COURSE DESCRIPTION CARD - SYLLABUS

Course name
The heat treatment and welding procesing

Course

Field of study
Mechanical Engineering
Area of study (specialization)

Level of study
First-cycle studies
Form of study
full-time

Year/Semester
1 / 2
Profile of study
general academic
Course offered in
polish language
Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

Lecturers

Responsible for the course/lecturer:
Dr eng. Wojciech Gęstwa

e-mail: wojciech.gestwa@put.poznan.pl

phone : 61 665 35 73

Faculty of Materials Engineering and Technical Physics

Piotrowo St 3, 60-965 Poznań

Responsible for the course/lecturer:
Ph.D. habil. eng. Andrzej Miklaszewski

e-mail: andrzej.miklaszewski@put.poznan.pl

phone : 61 665 3665

Faculty of Materials Engineering and Technical Physics

Piotrowo St 3, 60-965 Poznań

Prerequisites

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

Course objective

The gets to know of the basic methods of the heat treatment and welding as well as the technology of the heat treatment and welding of the different materials.

Course-related learning outcomes

Knowledge

1. The student should self-characterize the basic processes of heat treatment as well as their range of adaptation for individual materials in the aim of obtainment of their definite structure and property. [K_W09]

2. The student should self-characterize the basic processes of welding and their range of use for individual materials in the aim of obtainment of the definite proprieties of the joint of elements or obtainment of definite structure and the property of materials.[K_W09]

Skills

1. The student is able to choose the process of the heat treatment processing to the material in the aim of the obtainment of the suitable his mechanical proprieties. [K_U14]

2. The student is able to choose the welding process for obtainment of the joint of elements about suitable endurance. [K_U14]

3. The student is able to choose the welding process for formation of the structure and the property of the surface layer of materials. [K_U14]

4. The student has the indispensable preparation to the work in the industrial environment, particularly in the range of heat treatment and welding technology. [K_U24]

Social competences

1. The student is able to work in a group. [K_K03]

2. The student is aware of the role of the heat treatment and the welding processes in the modern economy and for the society. [K_K01,K_K02,K_K05]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The lecture

The credit of lecture on basis of exam consists of 8 questions which enclose the subject matter of heat treatment and welding technology or the test on the Moodle PP platform which is realized on the end of the semester.

Evaluation criteria: dst = 50.1 ÷ 60%; dst plus = 60.1 ÷ 70%; db = 70.1 ÷ 80%; db plus = 80.1 ÷ 90%; bdb = 90.1 ÷ 100%

The laboratory

The credit of laboratory on the basis of the answer oral or written from the scope of the content of each performed laboratory exercises (from 3 to 5 questions).

Evaluation criteria: dst ÷ dst+ = from 50.1 to 70%; db ÷ db+ = from 70.1 to 90%; bdb = from 90.1 to 100%

It gets the credit of laboratories all exercises have to be included (positive opinion from the answer and included reports).

Programme content

The lecture

The heat treatment processes: basic notions and definitions. The producibility of the machines part and tools from the viewpoint of the heat treatment and surface treatment. The device to the heat and surface treatment - protective atmospheres, the heating centres and quenching mediums. The quality control in the heat and surface treatment. Examples of the technological processes of the heat and surface treatment of the machines part and tools.

The welding technology - basic notions, indexing method. The thermal cycle of welding. The welding deformations. The weldability. The gas welding. The electric-arc welding - methods of MMA and SAW and automatic of sub-arc welding. The inert-gas arc welding - hand (GTA) and semi-automatic (GMA). The electric resistance welding. The thermal cutting.

The laboratories

The usual heat treatment of the iron alloys and the hardenability of steel; The heat treatment of non-ferrous alloys; The thermochemical treatment of the iron alloys;

The oxy-acetylene welding and the thermal cutting; The electric welding with used the covered electrode; The electric welding in gas shielding – method of MIG/MAG and TIG.

Teaching methods

The lecture: the lecture illustrated the multimedia introduction including under discussion of program contents. The laboratory: practical practices.

Bibliography

Basic

1. Totten G.E., Howes M. A. H.: Steel Heat Treatment Handbook; Marcel Dekker, Inc. 1997

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

3. Mizerski J.: Spawanie. Wiadomości podstawowe. Wydawnictwo REA, Warszawa 2005

4. Adamiec P. i inni: Poradnik inżyniera. Spawalnictwo. Tom 1, Pod redakcją Jana Pilarczyka, Wyd. Naukowo-Techniczne, Warszawa, 2003

5. Adamiec P. i inni: Poradnik inżyniera. Spawalnictwo. Tom 2, Pod redakcją Jana Pilarczyka, Wyd. Naukowo-Techniczne, Warszawa, 2005

Additional

1. Moszczyński A.: Nawęglanie gazowe stali, WNT, Warszawa 1983

2. Tokarski M.: "Metaloznawstwo metali i stopów nieżelaznych w zarysie" Wyd. "Śląsk" , 1986

3. Liščić B., Tensi H.M., Luty W.: Theory and Technology of Quenching; Springer-Verlag Berlin Heideberg New York; 1992

4. Totten G.E., Bates C.E., Clinton N.A.: Handbook of Quenchants and Quenching Technology; ASM International?; Materials Park, OH 44073-0002; May 1995

5. Klimpel A., Mazur M.: Podręcznik spawalnictwa. Wydawnictwo Politechniki Śląskiej, Gliwice 2004

6. Nowacki J., Chudziński M., Zmitrowicz P.: Lutowanie w budowie maszyn, Wyd. Naukowo-Techniczne, Warszawa, 2007

7. Ferenc K.: Spawalnictwo, Wyd. Naukowo-Techniczne, Warszawa, 2007

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	32	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	18	0,0

[1] delete or add other activities as appropriate