COURSE DESCRIPTION CARD - SYLLABUS

Course name
Materials welding technologies [S1IMat1>TTM]

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
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Artur Wypych
artur.wypych@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of physics, chemistry and materials science. The student has the ability to think logically, to use information obtained from the library and the Internet. Student understanding the need to learn and acquire new knowledge.

Course objective

Knowledge of technologies and methods of welding materials.

Course-related learning outcomes

Knowledge:
1. student should characterize various sources of welding heat. - [k_w02, k_w03, k_w07, k_w08]
2. the student should select the parameters of the bonding process. - [k_w07, k_w10, k_w16]
3. the student should define the elements of welds. - [k_w10, k_w12]

Skills:
1. the student is able to operate welding devices. - [k_u01, k_u05, k_u12]
2. the student is able to choose the initial conditions of the bonding processes. - [k_u08, k_u21]

3. the student is able to plan the bonding processes. - [k_u07, k_u09, k_u21]

Social competences:
1. the student is able to work in a group - [k_k01, k_k03, k_k04]
2. the student is aware of the role of bonding processes in the modern economy and for society. - [k_k06, k_k07

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: pass on the basis of a test consisting of 5 general questions (pass if the correct answer to at least 3 questions: <3? Ndst, 3? Dst, 3.5? Dst +, 4? Db, 4.5? Db +, 5? ? bdb) carried out at the end of the semester.
Laboratory: Passed on the basis of an oral or written answer regarding the content of each performed laboratory exercise, a report on each laboratory exercise according to the instructions of the laboratory teacher. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

Lectures:
1. Construction of welding equipment and external characteristics of welding equipment.
2.Bonding methods (welding: gas torch, MMA, TIG, MIG / MAG, SAW, plasma and microplasma; spot, line, spark-out, short circuit, friction welding; soldering and braze welding), hardfacing and thermal spraying (flame, arc) , supersonic, cold gas).
3.Methods of bonding dissimilar materials.
4.Characteristics and classification of additional materials for bonding.
Laboratories:
1.Production of test joints by welding methods: gas burner, MMA, GTA, GMA, SAW, plasma and microplasma; welding: spot, line, sparking, short-circuit, friction welding; soldering and brazing.
2. Investigation of the influence of linear welding energy on the size of the heat affected zone, measurement and study of the impact of spot welding power on the properties of welds.
3. Making flame sprayed layers and determining their quality with regard to the parameters of the spraying process.

Course topics

In terms of welding issues, the course will discuss the basic methods of welding using heat sources in the chronology of power and energy density, and the effects obtained with these heat sources in the form of welds, paddings and thermal sprayed coatings. The course topics also include the types and forms of additional materials and the types and role of protective atmospheres used in welding processes. The course explains basic issues based on physical phenomena such as exothermic reaction, electric current, highly ionized gas, coherent monochromatic light and electrical resistance. The metallurgical aspect from the point of view the selection of auxiliary materials for bonding will also be discussed, and the necessity of preparing base materials before the bonding process using various methods will be explained.

Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples given on the blackboard.
2. Laboratory exercises: practical exercises, discussion and preparation of the results in the form of a report, formulation of conclusions concerning the issues discussed during classes.

Bibliography

Basic
1. Spawanie zgrzewanie i cięcie metali, Klimpel A., WNT, Warszawa, 1999
2. Napawanie i natryskiwanie cieplne, Klimpel A., WNT, Warszawa, 2000
Additional
1. Poradnik Inżyniera Spawalnictwo cz.1, Pilarczyk J., WNT, Warszawa, 2001
2. Spawalnictwo, Ferenc K., WNT, Warszawa, 2007

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	65	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,00