COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modern technics of welding [S1IMat1>NTS]

Course

Field of study
Materials Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic out of physics, chemistry and material science. Logically thinking, take advantage of information acquire from library and the Internet. Want to study and new knowledge acquire understanding.

Course objective

Knowledge and understanding by the students the essence of modern techniques for welding due to the human factor, energy and economics. Awareness of the needs and direction of development in terms of modern welding technology due to reductions introduced heat, reducing the degree of mixing of the components and reducing the thickness of the surface layer.

Course-related learning outcomes

Knowledge:
1. the student should characterize the source of heat for welding due to the amount of heat generated.
2. the student should choose the bonding process parameters of the selected methods.
3. the student should define the kinds of connections produced welding methods.

Skills:
1. the student is able to handle modern welding equipment.
2. the student can choose the initial conditions for welding processes using modern welding consumables.
3. the student is able to schedule tasks for the implementation of modern welding processes.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: deduction on the basis of the final test consisting of 5 General questions (include in the case of the correct answers to 3 questions: < 3-ndst, 3-dst, 3.5-dst +, 4-4.5 db-db, 5-bdb) carried out at the end of the semester.
Laboratory: Passing on the basis of the answer oral or written from the scope of the content of each performed laboratory exercises, a report from each laboratory exercises according to the readings.
Grading laboratories: all the exercises must be positive (positive response and reports).

Programme content

Lectures:
1. Structure and working principle of modern welding equipment.
2. Characteristics of heat sources of welding for selected modern power sources.
3. Modern welding consumables in the form of wires and powders.
4. Characteristics and classification of materials in addition to bonding.
5. Connection Properties and layer properties produced welding methods and modern face.
6. Bonding developments and benefits arising from the use of modern methods of bonding because of the human factor, energy and economics.
Laboratories:
1. Execution of welds using modern welding materials in the form of solid wires and powder.
2. Execution of weld overlay using modern materials in the form of solid powder and wire welding and powders.
3. The execution of welding methods face layers with the use of additional material in the form of powders.
4. The study of operating properties produced welds and surface layers.
5. Comparison of the results obtained with those obtained from the connectors using the commonly used additional materials.

Course topics

The topics of the Modern Techniques of Welding course include a detailed description the operation principle of modern welding systems used for welding, padwelding and thermal spraying. The course describes the phenomena of heat generation inside the torches and guns used in the processes, as well as the physical phenomena used to generate metallurgical welding heat. It continues with a description of the basic properties of the obtained effects in the form of an analysis of the geometry of welds, weldpads and thermal sprayed coatings, as well as the metallurgical transformations occurring in base materials. The third part of the course applies the application issues explaining the possibility of using modern welding systems to change the properties and strength of welded nodes and the properties of surface coatings, as modern and original solutions, where previous applications using conventional methods were impossible.

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: performing exercises, discussion, team work.

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	75	3,00
Classes requiring direct contact with the teacher	33	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,00