



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Welding Engineering [S1ETI2>SPAW]

Course

Field of study

Education in Technology and Informatics

Year/Semester

2/4

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

dr inż. Artur Wypych
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Lecturers

Prerequisites

The student has basic knowledge of physics, material science, chemistry, environmental protection, mechanics. Has the ability to think logically, use information obtained from the library and the Internet. Understand the need to learn and acquire new knowledge.

Course objective

To learn modern methods of bonding and changing the properties of industry parts surface layer.

Course-related learning outcomes

Knowledge:

1. The student should characterize the different types of welding heat sources used in industry.
2. The student knows and understands the formation and use of electric current in welding.
3. The student should know and understand the selection of welding process parameters.
4. The student knows and understands the essence of bonding by methods used in industry.
5. The student is able to select the welding method for the type, thickness, shape and environment of exploitation parts.

Skills:

1. The student is able to operate welding equipment used in the production of exploitation parts.
2. The student is able to select the initial conditions of bonding processes.
3. The student is able to interpret the results obtained based on the geometry of the welds or the quality of the surface layer produced.

Social competences:

1. The student is able to cooperate in a group.
2. The student is aware of the role of automotive welded joint testing and inspection processes in the modern economy and for society.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: credit on the basis of a colloquium consisting of 5 general questions (credit in case of correct answers to min. 3 questions: <3 = ndst, 3 = dst, 3.5 = dst+, 4 = db, 4.5 = db+, 5 = bdb) conducted at the end of the semester.

Laboratory: Credit on the basis of an oral or written answer on the content of each laboratory exercise performed, a report on each laboratory exercise as indicated by the instructor of laboratory exercises. In order to receive credit for the laboratory exercises, all exercises must be passed (a passing grade on the answer and a passing grade on the report).

Programme content

The curricular content of the course prepares the student to obtain an international certificate of competence in welding by selected methods. The qualification can be granted by an international certification body.

Lectures:

1. Characteristics of welding heat sources used in industry.
2. Characteristics of the base materials used in welding.
3. Methodology of selection of process parameters and welding method as a function of the type of base material, its thickness and shape, and the working environment.
4. Basic methods of determining the selection of proper welding method and its parameters on the basis of weld, padding geometry and surface condition after surfacing process.
5. Methods of welding body parts protected by coatings.

Laboratories:

1. Construction and principle of operation of welding equipment.
2. Manufacturing of joints using selected methods in welding.
3. Manufacture of paddings by selected methods of surfacing.
4. Evaluation of change in the joint geometry as a function of method and parameters the welding process.
5. The effect of changing surfacing parameters on the degree of mixing and details surface condition.
6. Use of welding methods with and without additive material in welding production processes.

Course topics

Presentation of the joining methods used in industry and the responsibility that welds play in terms of durability and safety of construction. Metallurgical characteristics of low-energy joining methods that introduce the least amount of heat - due to reduction of the changes in properties of the base material in the immediate vicinity of the joints and anti-corrosion protective coatings degradation produced before the technological welding process. Characteristics of welds made using modern methods and modern additional materials and explanation of the mechanism of significant extension of the service life in the conditions of operational load of parts. Presentation of surfacing by welding methods as a way of changing the operational properties of new and regenerated parts. Presentation of the idea of surfacing method through the use of dissimilar materials, for the hard work surfaces production dedicated to a given operational environment.

Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples provided on the board, discussion of the physically presented exhibits.

2. Laboratory: discussion of the issue by the instructor in order to substantively prepare students for the course of the classes. Preparation of equipment, materials and details for analysis / technological process / laboratory operational tests. Registration of analysis and measurement results constituting the basis for preparing a report on the classes. Bibliography

Bibliography

Basic:

1. Pilarczyk J.: Poradnik Inżyniera. Spawalnictwo część 1. WNT, Warszawa 2003.1. Klimpel A.,: Spawanie, zgrzewanie i cięcie metali, WNT Warszawa 1999,
2. Klimpel A.,: Spawanie, zgrzewanie i cięcie metali, WNT Warszawa 1999.

Additional:

1. World scientific publication databases as a SCOPUS, Elsevier etc., keywords or phrases - "welding/surfacing by welding methods, methods of manufacturing welded joints".
2. Klimpel A.,: Napawanie i natryskiwanie cieplne, WNT Warszawa 2000.
3. Dobrzyński L.: Metaloznawstwo, WNT Warszawa 1998,
4. Prowans. S.: Struktura stopów, PWN Warszawa 2000,
5. Dobaj E.: Maszyny i urządzenia spawalnicze, WNT Warszawa 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	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)	25	1,00