

# Welding Technology - opis przedmiotu

| Informacje ogólne   |                                     |
|---------------------|-------------------------------------|
| Nazwa przedmiotu    | Welding Technology                  |
| Kod przedmiotu      | 06.1-WM-ER-MiBM-15_18               |
| Wydział             | <a href="#">Wydział Mechaniczny</a> |
| Kierunek            | WM - oferta ERASMUS                 |
| Profil              | -                                   |
| Rodzaj studiów      | Program Erasmus                     |
| Semestr rozpoczęcia | semestr zimowy 2022/2023            |

| Informacje o przedmiocie        |                                                                        |
|---------------------------------|------------------------------------------------------------------------|
| Semestr                         | 1                                                                      |
| Liczba punktów ECTS do zdobycia | 4                                                                      |
| Typ przedmiotu                  | obowiązkowy                                                            |
| Język nauczania                 | angielski                                                              |
| Sylabus opracował               | <ul style="list-style-type: none"><li>dr inż. Paweł Schlafka</li></ul> |

| Formy zajęć  |                                         |                                        |                                            |                                           |                     |
|--------------|-----------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------|---------------------|
| Forma zajęć  | Liczba godzin w semestrze (stacjonarne) | Liczba godzin w tygodniu (stacjonarne) | Liczba godzin w semestrze (niestacjonarne) | Liczba godzin w tygodniu (niestacjonarne) | Forma zaliczenia    |
| Wykład       | 30                                      | 2                                      | -                                          | -                                         | Egzamin             |
| Laboratorium | 15                                      | 1                                      | -                                          | -                                         | Zaliczenie na ocenę |
| Projekt      | 15                                      | 1                                      | -                                          | -                                         | Zaliczenie na ocenę |

## Cel przedmiotu

The aim of the course is to provide students with basic knowledge of welding processes, selection of optimum bonding technology, methods, quality control of welded joints.

## Wymagania wstępne

Manufacturing engineering, materials science, Principles of TBM.

## Zakres tematyczny

**Lecture content.** Morphology welded, soldered and welded. Call quality control methods, as well as safety rules. Structure and properties of bonded joints. Weldability of metals. Arc welding. Electric welding without the use of the arc. Gas welding and cutting. Electric welding. Soldering and brazing. Welding related processes: spray metallizing. surface hardening. review and criteria for the selection of optimal bonding technology (welding, soldering, thermal cutting). Mechanization and automation in welding. Welding stresses and strains. Design Basics bonded connections. Welding of non-compliance and evaluation of the quality of welded joints. The project comprised of the weld metal of more than 1 m in length.

**TOPICS LABORATORY:** Effect of pre-heating on the structure of welded carbon and alloy steel, Construction of macro and micro weld, Selection of welding parameters, The influence of welding parameters on the construction of welded joints, Manual arc welding, Semi-automatic welding in gas-shielded, Monitoring and classification rules welds, Welding and brazing, Construction of solder joint, Welding defects, Test methods for welded joints (destructive testing, non-destructive testing).

**PROJECT:** As part of the course, parameters and developed technology of welded joints will be selected. The control methods will be selected.

## Metody kształcenia

Lectures with audio visual aids. working with professional literature. individual and team execution of laboratory exercises. execution of the project.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

| Opis efektu                                                                                                                                                                                           | Symbole efektów | Metody weryfikacji                                                                                                                                    | Forma zajęć                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| K_W10 He has detailed knowledge of the morphology of welded, soldered and welded, structure and properties of bonded joints and weldability of metals and their alloys, welding stresses and strains. |                 | <ul style="list-style-type: none"><li>egzamin - ustny, opisowy, testowy i inne</li><li>projekt</li><li>wykonanie sprawozdań laboratoryjnych</li></ul> | <ul style="list-style-type: none"><li>Wykład</li><li>Laboratorium</li><li>Projekt</li></ul> |
| K_U16 Able to develop terms and conditions of the weld.                                                                                                                                               |                 | <ul style="list-style-type: none"><li>projekt</li></ul>                                                                                               | <ul style="list-style-type: none"><li>Projekt</li></ul>                                     |

| Opis efektu                                                                                                                                                                                                                                                                                                                                                                                                       | Symbole efektów | Metody weryfikacji                                                                                                                                                                                                                                                                                                              | Forma zajęć                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| K_K01 Understand the importance and need for learning throughout life                                                                                                                                                                                                                                                                                                                                             |                 | <ul style="list-style-type: none"> <li>bieżąca kontrola na zajęciach</li> <li>dyskusja</li> <li>przygotowanie projektu</li> </ul>                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Laboratorium</li> <li>Projekt</li> </ul>                 |
| K_K02 Understand the non-technical aspects of the mechanical engineer, the validity and effects, including the impact on the environment                                                                                                                                                                                                                                                                          |                 | <ul style="list-style-type: none"> <li>dyskusja</li> <li>egzamin - ustny, opisowy, testowy i inne</li> </ul>                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Wykład</li> <li>Laboratorium</li> <li>Projekt</li> </ul> |
| K_W16 Knows the basic methods and techniques of welding (arc welding, electric welding without the use of an arc, gas welding), welding, soldering and brazing. He knows the related welding processes: metal spraying, surface hardening and the criteria for selection of optimal bonding technology, as well as the basis of design of welded joints, imperfections and evaluate the quality of welded joints. |                 | <ul style="list-style-type: none"> <li>aktywność w trakcie zajęć</li> <li>bieżąca kontrola na zajęciach</li> <li>egzamin - ustny, opisowy, testowy i inne</li> <li>obserwacja i ocena aktywności na zajęciach</li> <li>odpowiedź ustna</li> <li>przygotowanie projektu</li> <li>wykonanie sprawozdań laboratoryjnych</li> </ul> | <ul style="list-style-type: none"> <li>Wykład</li> <li>Laboratorium</li> <li>Projekt</li> </ul> |
| K_K03 Able to interact and work in a group, taking in the different roles<br>Able to interact and work in a group, taking in the different roles                                                                                                                                                                                                                                                                  |                 | <ul style="list-style-type: none"> <li>aktywność w trakcie zajęć</li> <li>obserwacja i ocena aktywności na zajęciach</li> <li>obserwacje i ocena umiejętności praktycznych studenta</li> </ul>                                                                                                                                  | <ul style="list-style-type: none"> <li>Laboratorium</li> <li>Projekt</li> </ul>                 |

## Warunki zaliczenia

Lecture - positive evaluation of the written exam, the activity in the classroom.

The laboratory - provided credit is to get positive ratings from all the exercise. Final rating depends on the ratings of the partial report and oral responses in class activities.

The project - provided credit is to get a positive assessment of the project.

## Literatura podstawowa

1. Lecture materials
2. Advisory Engineer - Welding, Edited by Prof. J. Pilarczyk, Vol 1, WNT, Warsaw 2003
3. S. Butnicki: "Weldability of steel and fragility." WNT, Warsaw 1979
4. E. Cleaver, "Metallurgy and Metallography of welds." AGH, Kraków 1985
5. E. Cleaver, "Weldability of steel." Fotobit, Kraków 2002
6. A. KLIMPEL, A. Szymanski "Quality control in the welding industry." Publisher Silesian Technical University, Gliwice, 1992.
7. Z. Pawłowski, "Destructive testing". Warsaw 1988
8. EN 26520 - Classification of imperfections in welded joints of metal with an explanation.
9. Guide to Technology laboratory of permanent joints

## Literatura uzupełniająca

1. K Przybyłowicz: „Metallurgy". WNT, Warsaw 1999
2. L.A. Dobrzanski : "The basics of metallurgy materials science." WNT, Warsaw 1996
3. L.A. Dobrzanski: Fundamentals of materials science and materials science". WNT, Warsaw 2002
4. J. Barcik, M. Kupka, A. Wala: „Metal Technology", Ed. Univ. Silesia, Katowice 2000

## Uwagi

Zmodyfikowane przez dr Katarzyna Skrzypek (ostatnia modyfikacja: 23-04-2022 10:39)

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