# COURSE FORM

# Basic information

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| To be completed by Course Team | Module name : | | | | | | | | | Module code: | | | | | |
| Course name:  **Welding processes and technology** | | | | | | | | | Course code: | | | | | |
| Faculty:  **Institute of Technology** | | | | | | | | | | | | | | |
| Field of study:  **Mechanical engineering** | | | | | | | | | | | | | | |
| Mode of study :  **full time** | | | | | Learning profile:  **practical** | | | | Speciality: | | | | | |
| Year/ semester: | | | | | Module/ course status: | | | | Module/ course language:  **English** | | | | | |
| Type of classes | | lecture | | lessons | | lab | | project | | tutorial | | | other (please specify) | |
| Course load | | **15** | |  | |  | | **7,5** | |  | | |  | |
| Course objectives | | | | Delivering information on welding processes and technology; especially, introduction to thermal joining and cutting of metals, welding metallurgy and steel weldability. | | | | | | | | | | | |
| Entry requirements | | | | Basic knowledge of materials science. | | | | | | | | | | | |
| **LEARNING OUTCOME** | | | | | | | | | | | | | | | |
| Nr | | LEARNING OUTCOME DESCRIPTION | | | | | | | | | | | | | Learning outcome reference |
| 1 | | Knows the basic technologies of welding and cutting of metals and alloys | | | | | | | | | | | | | K1P\_W13 |
| 2 | | Knows rules for the selection of materials for welded structures and characterize their behavior during welding | | | | | | | | | | | | | K1P\_W09 |
| 3 | | Recognizes and classifies methods of welding and cutting | | | | | | | | | | | | | K1P\_U18 |
| 4 | | Can prepare welding technological documentation for construction | | | | | | | | | | | | | K1P\_U17 |
| Assessment method | | | | | | | | | | | | | Learning outcome number | | |
| Exam: written examination – theory | | | | | | | | | | | | | 1, 2, 3 | | |
| Project and laboratory work : assessment in a vocational area | | | | | | | | | | | | | 4 | | |
| **STUDENT WORKLOAD** | | | | | | | | | | | | | | | |
|  | | | | | | | | Number of hours | | | | | | | |
| In all | | | | Practical hours | | | |
| Participation in lectures | | | | | | | | 15 | | | |  | | | |
| Independent study of lecture topics | | | | | | | | 12,5 | | | |  | | | |
| Participation in tutorials, labs, projects and seminars | | | | | | | | 7,5 | | | | 7,5 | | | |
| Independent preparation for tutorials\* | | | | | | | |  | | | |  | | | |
| Preparation of projects/essays/etc. \* | | | | | | | | 15 | | | |  | | | |
| Preparation/ independent study for exams | | | | | | | | 15 | | | |  | | | |
| Participation during consultation hours | | | | | | | | 5 | | | |  | | | |
| Other | | | | | | | |  | | | |  | | | |
| **TOTAL student workload in hours** | | | | | | | | 70 | | | |  | | | |
| **Number of ECTS credit per course unit** | | | | | | | | **3** | | | | | | | |
| Number of ECTS credit associated with practical classes | | | | | | | | **1,7** | | | | | | | |
| Number of ECTS for classes that require direct participation of professors | | | | | | | | 1,4 | | | | | | | |

# Detailed information

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| To be completed by Course Team | Module name : | | | | | | | | Module code: | | |
| Course name:  **Welding processes and technology** | | | | | | | | Course code: | | |
| Faculty:  **Institute of Technology** | | | | | | | | | | |
| Field of study:  **Mechanical engineering** | | | | | | | | | | |
| Mode of study :  **Full time** | | | | | Learning profile:  **practical** | | | Speciality: | | |
| Year/ semester: | | | | | Module/ course status: | | | Module/ course language:  **English** | | |
| Type of classes | lecture | | | lessons | | lab | project | | tutorial | other (please specify) |
| Course load | **15** | | |  | |  | **7,5** | |  |  |
| Module/ course coordinator | | | | Jerzy Łabanowski, D.Sc. Ph.D. Eng. prof. | | | | | | | |
| Lecturer | | | | Jerzy Łabanowski, D.Sc. Ph.D. Eng. prof. | | | | | | | |
| **CURRICULUM CONTENTS** | | | | | | | | | | | |
| **Lecture** | | | | | | | | | | | |
| Arc welding an overview: terminology, distortion, the welding arc shielding gases, power sources. Metal arc welding with coated electrodes. Description of the method equipment, electrodes, weld defects. Gas welding. TIG welding. Description of the method, equipment, consumables. MIG/MAG welding, equipment, setting of welding parameters, consumables, weld quality. Submerged arc welding. Description, equipment, filler material, the effect of the welding parameters, productivity improvements, joint preparation, risks of weld defects  Plasma welding. A description of the method, equipment, gases for plasma welding, the advantages of the plasma method.  Pressure welding methods. Resistance welding. Friction welding. High-frequency welding. Ultrasonic welding. Explosion welding. Magnetic pulse welding. Cold pressure welding. Diffusion welding Other methods of welding. Electroslag welding. Electrogas welding. Laser welding. Electron beam welding. Thermite welding Cutting methods. Thermal cutting. Water jet cutting. Thermal gouging. Soldering and brazing. Soft soldering. Brazing. The weldability of steel. Carbon steels. High-strength and extra high-strength steels. Austenitic steels. | | | | | | | | | | | |
| Laboratory | | | | | | | | | | | |
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| **Project** | | | | | | | | | | | |
| Practical application of known methods of welding and cutting to the development of welding technology, technical and economic analysis of technological variants. Strength calculations of welded joints. | | | | | | | | | | | |
| Basic literature | | | 1. Weman K., Welding processes handbook. Woodhead Publishing Ltd., 2003. 2. Welding, brazing and soldering, Metals Handbook, vol. 6. American Society for Metals, Metals Park, Ohio 1993. 3. O’Brien R., (Ed) Jefferson’s Welding Encyclopedia, Eighteenth Edition, American Welding Society, 1993. | | | | | | | | |
| Additional literature | | |  | | | | | | | | |
| Teaching methods | | | Lecture: theory - traditional and multimedia presentation. | | | | | | | | |
| Form and terms of an exam | | | Lecture: qualifying exam (50% included) | | | | | | | | |