WELD 0001A - INTRODUCTORY WELDING FOR METALWORKING

Catalog Description

Formerly known as WELD 15
Hours: 72 (18 lecture, 54 laboratory)
Description: Hands-on survey class that focuses on the three common welding processes of Shielded Metal Arc Welding, Gas Metal Arc Welding, and Gas Tungsten Arc Welding, including correct setup and "how to" techniques. Plasma Arc Cutting and Oxyacetylene Cutting processes are also covered. This class is a survey of basic welding, cutting and fabrication used by the welding industry, metalworking artists, and interested hobbyists. Perfect for students who have never welded before. (CSU)

Course Student Learning Outcomes

- CSLO #1: Apply safety standards for both a learning environment and work site environment with focus on SMAW, GMAW, GTAW welding processes, plus OAC, PAC cutting processes, and hand and power tool equipment used in the building of assigned student project.
- CSLO #2: Define terms related to this course: electrode, shielded metal arc, arc length, porosity, slag, resistance welding, box and pan brake, layout, PPE - Personnel Protective Equipment.
- CSLO #3: Compare the historical development of electric arc welding processes used from the early 1900's SMAW, late 1940's GMAW and early 1940's GTAW.

Effective Term

Fall 2019

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

36

Total Student Learning Hours

108

Course Objectives

Lecture Objectives:
1. Establish expectation standards for proper and safe use of general metal working equipment and tools.
2. Demonstrate proper use of a tape measure on both inside and outside measurements.
3.Define and review welding terms used in the welding and cutting processes covered in this course.
4. Discuss and follow the standards of proper and safe use of electric welding and cutting processes.
5. Discuss and follow the standards of proper and safe use of fuel gas cutting process.
6. Explain theory of the electric arc as the heat source of welding and cutting.
7. Compare the differences of the common welding processes covered.
8. Identify the differences of welding filler metals used in these processes.
9. Explain the five essentials needed in performing Shielded Metal Arc Welding (Stick Welding).
10. Compare the different techniques used with the various electrodes of SMAW.
11. Examine the differences in GMAW wire feed welding processes from other arc welding processes.
12. List the modes of metal transfers used in Gas Metal Arc Welding (MIG Welding).
13. Identify the proper characteristics of the short circuit transfer used in GMAW-S.
14. Name the equipment components that make up the GMAW process, such as wire feeder and its sub components.
15. Illustrate the relationship between wire feed speed and voltage (heat) in setting the GMAW process.
16. Review the shielding gases used and maintenance of the GMAW process.
17. Label the components of the Gas Tungsten Arc Welding torch and system (GTAW/TIG Welding).
18. Illustrate the proper method of grinding the tungsten electrode and types of tungsten.
19. Differentiate between the polarities used in GTAW for each metal welded.
20. Contrast the technologies used for arc starting inherent with GTAW.
21. Explain Resistance welding applications and use.
22. Discuss the positions of welding 1F/1G vs. 2F/2G vs. 3F/3G, etc.
23. Identify and perform the basic math functions needed to construct Metal Art or basic individual welded projects.
24. Describe the operation of metalworking machines including the Rotex punch, drill press, cheek bar folder, box and pan brake, Beverly hand shear, power shear, beading rolls, band and cold saws, and hand angle grinder.
Laboratory Objectives:
1. Employ safe practices when using related welding machines.
2. Demonstrate the correct and safe use of hand and power shop equipment.
3. Practice and model the terms used in this course for the welding and cutting processes.
4. Follow the correct set up and adjust the operation of the welding machines used for; SMAW, GMAW, and GTAW.
5. Apply practices used for the proper settings required for each welding process of SMAW, GMAW, and GTAW.
6. Identify each commonly used welding rod related to the welding processes covered.
7. Demonstrate correct operation of the cutting equipment used for OFW, and PAC.
8. Practice the three welding processes incorporated in this course to skill proficiency.
9. Analyze weld defects associated with welding processes and perform corrective procedures.
10. Produce SMAW fillet weld in the flat position using E6013 to acceptable visual standard of industry.
11. Produce GMAW short circuit transfer, fillet weld on carbon steel in the horizontal and vertical positions to acceptable visual standard of industry.
12. Produce GTAW fillet weld in the flat position on carbon steel to acceptable visual standard of industry.

13. Apply addition, subtraction, multiplication and division of basic fractions used in measurement.
14. Construct with standard project component parts following blueprint specifications to develop assigned student project.
15. Using metalworking tools, cut and form component parts for assigned student project.
16. Show Resistance welding process on carbon steel.
17. Apply demonstrated techniques to apply welds with each welding process used in this course on the assigned student project.
18. Recognize square and symmetry using standard metalworking tools, tape measures and fixtures.
19. Design and create additional component parts to add to the student project using metal working equipment.
20. Display completed student project for course evaluation.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Objective Examinations
  - Example: Written examination on principles of each different welding process, safety and process applications. Example question: GTAW stands for? A. Gas Tungsten Arc Welding, B. Gas Tungsten Accepted Welding, C. Gas Tuck Arc Welding, D. None of the above.
- Projects
  - Example: Each student project is evaluated based on both completing the expectation criteria and on the creativity by the student of the assignment. Example: The assessment includes elements of following supplied prints, welding execution, effort placed on creativity portion of assigned project. Example project may include building or construction of a briquette starter.
- Skill Demonstrations
  - Example: Student will demonstrate competence in each of the applied welding processes. Example: Practical application in use on the student's course project. Grade based on industry standard.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. With instructor demonstration and oversight, students will apply learned knowledge to develop manipulative skills in the various types of welding equipment covered in this course. Students are expected to be able to name each piece of equipment.

Lecture:

1. Lecture and group discussion on the various types and application of welding processes with lab demonstration. Students are expected to participate in the discussion.

Distance Learning

1. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

Typical Out of Class Assignments Reading Assignments

1. Reading from assigned textbook on a weekly basis. Example: Study and discuss the principles and techniques of stick welding and be prepared to discuss in class. 2. Reading from supplemental material on a regular basis. Example: Read and discuss foundations of Gas Metal Arc Welding Equipment.

Writing, Problem Solving or Performance

1. Answer review questions in the text chapter following the reading assignment. 2. Evaluate and compare the relationship between GMAW wire feed speed and voltage energy required to sustain the short circuit transfer on different thicknesses of low carbon steel, document machine settings with success results. 3. Demonstrate knowledge and proficiency in the assembly, disassembly, and maintenance of the parts typically expected to be performed by the welder.

Other (Term projects, research papers, portfolios, etc.)

1. Student will use the three welding processes and two cutting processes in the individual construction of one project.

Required Materials

- Modern Welding
  - Author: Althouse, Turnquist, Bowditch
  - Publisher: Goodheart -Willcox
  - Publication Date: 2020
  - Text Edition: 12th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Welding Principles and Practices
  - Author: Edward R. Bohnart
  - Publisher: McGraw Hilll
  - Publication Date: 2017
  - Text Edition: 5th
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.