



# WELD 240 - Welding Technology 3 Course Outline

Approval Date: 05/10/2018

Effective Date: 06/01/2018

## SECTION A

**Unique ID Number** CCC000288805

**Discipline(s)** Welding

**Division** Career Education and Workforce Development

**Subject Area** Welding

**Subject Code** WELD

**Course Number** 240

**Course Title** Welding Technology 3

**TOP Code/SAM Code** 0956.50 - Welding Technology/Welder\* / B - Advance Occupational

**Rationale for adding this course to the curriculum** The third semester of Welding Technology delves into the Metallurgy and welding of Low, Medium, and High Carbon Steels, Low Alloy and Stainless Steels, Cast Iron, and Aluminum Concepts and skill development are focused on Brazing, GTAW, GMAW, and FCAW in all positions. Patination and related subjects for coloring metals is also covered.

**Units** 7

**Cross List** N/A

**Typical Course Weeks** 9

**Total Instructional Hours**

### Contact Hours

**Lecture** 54.00

**Lab** 216.00

**Activity** 0.00

**Work Experience** 0.00

**Outside of Class Hours** 108.00

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**Total Contact Hours** 270

**Total Student Hours** 378

**Open Entry/Open Exit** No

**Maximum Enrollment**

**Grading Option** Letter Grade or P/NP

**Distance  
Education Mode  
of Instruction**

**SECTION B**

**General Education Information:**

**SECTION C**

**Course Description**

**Repeatability** May be repeated 0 times

**Catalog Description** The third semester of Welding Technology continues with the advancement of welding skills in all areas. The study of joint design, materials, layout, symbols, metallurgy, material identification is expanded; material preparation and finishing, including patination is introduced.

**Schedule  
Description**

**SECTION D**

**Condition on Enrollment**

**1a. Prerequisite(s)**

- WELD 120 or
- WELD 130 or
- WELD 100

**1b. Corequisite(s):** *None*

**1c. Recommended**

- WELD 120 and
- WELD 121 or
- equivalent coursework.

**1d. Limitation on Enrollment:** *None*

**SECTION E**

**Course Outline Information**

**1. Student Learning Outcomes:**

- A. Student identifies and uses appropriate Personal Protective Equipment (PPE).
- B. The student works cooperatively with others in a shop setting.
- C. The student can use SMAW, GTAW, GMAW, and FCAW welding procedures to make fillet and groove welds in all four manufacturing positions and in all five joint designs.

**2. Course Objectives:** Upon completion of this course, the student will be able to:

- A. Demonstrate knowledge of and practice safe work and personal habits
- B. Demonstrate professional mastery of the tools, machines and equipment of welding
- C. Examine and identify the nomenclature of electrodes, gases and other supplies of the welding field
- D. Identify materials, joint designs, and prepare materials
- E. Perform trade standard skills in setting up and using welding equipment of oxyacetylene, SMAW, GMAW, FCAW, and GTAW.
- F. Demonstrate increased knowledge of procedures, processes and techniques in welding
- G.

**3. Course Content**

- A. Review of Knowledge, Skill Improvement

- a. Safety
- b. Cutting processes
  - a. Manual and machine oxyacetylene and other gases
  - b. Electric arc cutting: Air arc and electrode cutting
  - c. Cutting nozzles and gas pressures
- c. Oxyacetylene welding, brazing and heat treating
  - a. Oxyacetylene and braze welding
  - b. Brazing and soldering
  - c. Hard surfacing
  - d. Heating and flame treating
- d. Electric arc welding with stick electrodes
  - a. Machines and equipment
  - b. Polarity – straight and reverse
  - c. Nomenclature of electrodes and coating
  - d. Preparation of metals for welding
  - e. Starting and setting machines; striking and maintaining the arc
  - f. Running the basic bead
  - g. Flat, horizontal, vertical and overhead welding with various electrodes
- e. Gas shielded arc welding (GMAW, FCAW and GTAW)
  - a. Machines and equipment
  - b. Shielding gases
  - c. Filler metal and preparation of materials
  - d. Arc transfer
  - e. Current (high frequency, constant potential, variable potential)
- f. Materials
  - a. Ferrous and non-ferrous materials
  - b. Properties and strengths of metals
  - c. Identification of metals
- g. Related subjects
- h. Preparing and finishing materials
- B. Other Welding Processes Theory
  - a. Forge welding
  - b. Thermit welding
  - c. Electron beam welding
  - d. Laser welding
  - e. Induction welding
  - f. Explosive welding
  - g. Friction welding
  - h. Resistance welding
  - i. Electro slag welding
- C. Inspecting and Testing
  - a. Theory and use of testing apparatus and equipment
  - b. Testing techniques
  - c. Evaluation by visual appearance
  - d. Destructive testing
  - e. Non-destructive testing
  - f. Types of coupons
  - g. Chemical analyzing
  - h.

#### **4. Methods of Instruction:**

**Lab:**

**Lecture:**

**Other:** Lectures with white board and computer presentations Visual laboratory demonstrations of welding techniques Hands-on laboratory activities

**5. Methods of Evaluation:** Describe the general types of evaluations for this course and provide at least two, specific examples.

**Typical classroom assessment techniques**

Exams/Tests --

Final Exam --

Mid Term --

Additional assessment information:

Students will be given written weekly tests covering assigned reading and weekly lectures. (example: tests comprised of multiple choice and T/F questions)

Students will complete weekly lab assignments. (example: place a weld on a Bevel groove butt with an .035 ER70S-6 electrode in the 4G position)

Students will be given a mid-term and final examination. (example: tests comprised of multiple choice, identification, short answer and T/F questions)

Letter Grade or P/NP

**6. Assignments:** State the general types of assignments for this course under the following categories and provide at least two specific examples for each section.

**A. Reading Assignments**

1. Students will be required to read selections from their textbook in order to understand essential concepts (example: section on Welding Medium Carbon Steel, Lincoln Electric, textbook)

2. Students will be required to read selections from their textbook and lecture notes in order to perform lab exercises. (example: place a fillet weld on a T plate with a 2%ceriated electrode in the 4G position)

**B. Writing Assignments**

1. Students will be required to write-up lab assignments. (example: List three corrective measures that may be taken to reduce heat distortion)

2. Students will be required to formulate corrective actions while welding. (example: correctly adjusting machine settings to achieve the proper bead profile)

3. Students will interpret welds to formulate corrective action. (example: determine possible changes in setting parameters and/or technique to avoid undercut and cold lap)

**C. Other Assignments**

1. Each student shall research a topic of their choosing, complete a three page report and give an oral presentation to the class.

2. Each student will design and fabricate a project utilizing a sketch or print and appropriate welding procedures, then perform a Visual Inspection and critique per given standards.

**7. Required Materials**

**A. EXAMPLES of typical college-level textbooks (for degree-applicable courses) or other print materials.**

Book #1:

Author: B.J. Moniz

Title: Welding Skills

Publisher: American Technical Publishers, Inc

Date of Publication: 2015

Edition: 5th  
Book #2:  
Author: Lincoln Electric  
Title: Metals and How to Weld  
Publisher: Lincoln Electric  
Date of Publication: 1990  
Edition: 2nd

Book #3:  
Author: Althouse, Turnquist, Bowditch, Bowditch, & Bowditch  
Title: Modern WElding  
Publisher: Goodheart-Willcox  
Date of Publication: 2004  
Edition: 10th

**B. Other required materials/supplies.**

- Safety glasses and gauntlet style welding gloves.