

## Washtenaw Community College Comprehensive Report

### WAF 114 Ironworker Pre-Apprenticeship Introduction to Welding Effective Term: Fall 2020

#### Course Cover

**Division:** Advanced Technologies and Public Service Careers  
**Department:** Welding and Fabrication  
**Discipline:** Welding and Fabrication  
**Course Number:** 114  
**Org Number:** 14600  
**Full Course Title:** Ironworker Pre-Apprenticeship Introduction to Welding  
**Transcript Title:** Ironworker Intro to Weld & OFC  
**Is Consultation with other department(s) required:** No  
**Publish in the Following:** College Catalog , Web Page  
**Reason for Submission:** Course Change  
**Change Information:**  
     **Course description**  
     **Credit hours**  
     **Total Contact Hours**  
     **Distribution of contact hours**  
     **Pre-requisite, co-requisite, or enrollment restrictions**  
     **Outcomes/Assessment**  
     **Objectives/Evaluation**

**Rationale:** This course is being updated to better align with the Ironworkers Pre-Apprentice certificate.

**Proposed Start Semester:** Winter 2020

**Course Description:** In this course, students will be introduced to Shielded Metal Arc Welding (SMAW), Flux-Cored Arc Welding (FCAW), Oxy-Fuel Gas Welding and Cutting (OFC-W/C), Soldering and Brazing processes and how the processes apply to the Ironworker trade. The student will apply these processes to various joint designs using proper techniques on steel plates and structural shapes. Welding vocabulary, welding theory, safety precautions and safe work practices will be covered. This course contains material previously taught in WAF 115. This course is required for the Ironworkers Pre-Apprenticeship Certificate.

#### Course Credit Hours

**Variable hours:** No

**Credits:** 3

**Lecture Hours: Instructor:** 15 **Student:** 15

**Lab: Instructor:** 60 **Student:** 60

**Clinical: Instructor:** 0 **Student:** 0

**Total Contact Hours: Instructor:** 75 **Student:** 75

**Repeatable for Credit:** NO

**Grading Methods:** Letter Grades

Audit

**Are lectures, labs, or clinicals offered as separate sections?:** NO (same sections)

#### College-Level Reading and Writing

Reduced Reading/Writing Scores

## **College-Level Math**

No Level Required

### **Requisites**

#### **Prerequisite**

Academic Reading Level 3, Academic Writing Level 2

### **General Education**

#### **Degree Attributes**

Below College Level Pre-Reqs

### **Request Course Transfer**

#### **Proposed For:**

### **Student Learning Outcomes**

1. Set up Oxy-Fuel equipment, and perform a cut on carbon steel plate.

#### **Assessment 1**

Assessment Tool: Student project

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 70% of students will score 70% or above.

Who will score and analyze the data: Departmental faculty

2. Identify proper applications, terms and materials for oxy-fuel cutting processes.

#### **Assessment 1**

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

3. Set up equipment, and perform a Shielded Metal Arc Weld on plate.

#### **Assessment 1**

Assessment Tool: Student project

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

4. Identify proper applications, terms and materials for Shielded Metal Arc Welding.

#### **Assessment 1**

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of the students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

5. Set up equipment, and perform a Flux-Cored Arc Weld.

**Assessment 1**

Assessment Tool: Student project

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

6. Identify proper terms, materials, safety and applications for Flux Cored Arc Welding processes.

**Assessment 1**

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

**Course Objectives**

1. Unit 1 Welding History: Trace early history of welding.
2. Unit 1 Welding History: Explain each of the common welding processes used by Ironworkers.
3. Unit 2 Welding History: Identify weld joints and welding symbols.
4. Unit 3 Welding History: Identify general rules for welding safety.
5. Unit 3 Welding History: Identify common welding tools.
6. Unit 4 Welding History: Explain the procedures for the preparation of base metals.
7. Unit 4 Welding History: Explain the procedures for performing simple welding repairs.
8. Unit 1 SMAW: Explain the advantages and disadvantages of Shielded Metal Arc Welding (SMAW).
9. Unit 2 SMAW: Identify, select and use safety equipment.
10. Unit 2 SMAW: Identify and choose preventions of potential site safety hazards.
11. Unit 3 SMAW: Explain basic electrical theories.
12. Unit 3 SMAW: Differentiate between various types of power sources.
13. Unit 3 SMAW: Select proper use of power source outputs.
14. Unit 4 SMAW: Explain the basic principles of SMAW.
15. Unit 4 SMAW: Describe the different types and proper applications of SMAW polarities.
16. Unit 5 SMAW: Identify SMAW equipment components.
17. Unit 5 SMAW: Select the proper SMAW power source for various applications.
18. Unit 6 SMAW: Repair electrode holders, work clamps and cables.
19. Unit 7 SMAW: Identify SMAW electrode characteristics.
20. Unit 7 SMAW: Identify American Welding Society (AWS) electrode classifications.
21. Unit 7 SMAW: Identify various electrode groups.
22. Unit 7 SMAW: Select proper electrodes for a job.
23. Unit 7 SMAW: Properly store electrodes.
24. Unit 8 SMAW: Set the primary variables to run a bead.

25. Unit 8 SMAW: Properly restart and terminate a bead.
26. Unit 9 SMAW: Evaluate weld quality.
27. Unit 9 SMAW: Troubleshoot the SMAW process.
28. Unit 1 FCAW: Explain the principles of gas shielded and self-shielded Flux-Cored Arc Welding (FCAW).
29. Unit 2 FCAW: Identify the proper safety equipment and hazards involved in FCAW.
30. Unit 3 FCAW: Explain the principles of basic electricity as it relates to FCAW.
31. Unit 4 FCAW: Identify the equipment used for the FCAW process.
32. Unit 5 FCAW: Identify the characteristics of different types of FCAW electrodes.
33. Unit 6 FCAW: Articulate the basics of FCAW equipment maintenance.
34. Unit 7 FCAW: Conduct the basic set up of the FCAW equipment.
35. Unit 8 FCAW: Demonstrate ability to properly use the FCAW equipment.
36. Unit 9 FCAW: Identify quality welds and troubleshoot issues with the FCAW equipment.
37. Unit 1 OFC and OFW: Explain the basic principles of Oxy-Fuel Cutting (OFC) and Oxy-Fuel Welding (OFW).
38. Unit 2 OFC and OFW: Identify and use the proper safety equipment for both OFC and OFW.
39. Unit 3 OFC and OFW: Identify and set up equipment for OFC.
40. Unit 4 OFC: Discuss the principles of OFC.
41. Unit 4 OFC: Demonstrate the OFC process.
42. Unit 4 OFC: Evaluate cut quality of OFC process.
43. Unit 5 OFW: Discuss the overview of the OFW process.
44. Unit 5 OFW: Perform basic welds with and without filler metal in the OFW process.
45. Unit 6 Oxy-Fuel Brazing: Discuss the principles of the Oxy-Fuel Brazing process.
46. Unit 7 Oxy-Fuel Soldering: Discuss the principles of Air Fuel Soldering.
47. Unit 7 Oxy-Fuel Soldering: Demonstrate the Air Fuel Soldering process.
48. Unit 8 Oxy-Fuel Consumables and Accessories: Describe the characteristics of Oxy-Fuel Gases.
49. Unit 8 Oxy-Fuel Consumables and Accessories: Identify various filler metals, fluxes, and accessories used in the various Oxy-Fuel Processes.

## **New Resources for Course**

### **Course Textbooks/Resources**

#### Textbooks

- International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Shielded Metal Arc Welding Reference Manual*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO., 2016
- International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Flux Cored Arc Welding Reference Manual*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO, 2006
- International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers. *Introduction to Welding - Reference Manual*, ed. International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers, 2016
- International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers. *Oxyfuel Gas Cutting and Welding - Reference Manual*, ed. International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers, 2016
- International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers. *Welding for Ironworkers - Student Workbook*, ed. International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers International, 2016

#### Manuals

#### Periodicals

#### Software

### **Equipment/Facilities**

Level III classroom

<b><u>Reviewer</u></b>	<b><u>Action</u></b>	<b><u>Date</u></b>
<b>Faculty Preparer:</b> <i>Amanda Scheffler</i>	<i>Faculty Preparer</i>	<i>Nov 08, 2019</i>
<b>Department Chair/Area Director:</b> <i>Glenn Kay II</i>	<i>Recommend Approval</i>	<i>Nov 08, 2019</i>
<b>Dean:</b> <i>Brandon Tucker</i>	<i>Recommend Approval</i>	<i>Dec 10, 2019</i>
<b>Curriculum Committee Chair:</b> <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Feb 03, 2020</i>
<b>Assessment Committee Chair:</b> <i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>Feb 11, 2020</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Feb 14, 2020</i>