

# APSM 114: SMQ-14 WELDING 2: GMAW

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	1.5
Hours:	12 lecture, 28 laboratory per quarter (40 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship Program.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	None
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

## Student Learning Outcomes

- A successful student will be able to Demonstrate the proper procedure for setting up OFC (Oxy-fuel cutting), PAC (Plasma arc cutting) and FCAW (Flux core arc welding) equipment.
- A successful student will be able to produce weld samples in the flat, vertical and overhead positions with the GMAW process on stainless steel to acceptable criteria.

## Description

This course continues with development of Gas Metal Arc Welding and Flux Core Arc Welding skills. In addition, the SMAW welding process and metallurgy are introduced. Progress in student welding skill development is essential.

## Course Objectives

The student will be able to:

- Identify and minimize potential hazards in a welding environment
- List essential PPE (personal protective equipment) items used when welding
- Identify the components of SMAW, GMAW and FCAW equipment
- Demonstrate the proper procedure for setting up SMAW, GMAW and FCAW equipment
- Identify effects of heat input and cooling rate with base materials
- Produce weld samples in various positions with the GMAW, FCAW and SMAW processes to acceptable criteria
- Interpret various welding codes and standards

## Course Content

- Identify and minimize potential hazards in a welding environment
  - Job-site and shop safety
- List essential PPE (personal protective equipment) items used when welding
- Identify the components of SMAW, GMAW and FCAW equipment
- Demonstrate the proper procedure for setting up SMAW, GMAW and FCAW equipment

- Identify effects of heat input and cooling rate with base materials
  - Concepts of microstructure effects from heat input and cooling rates
  - Adjust voltage and amperage for various base materials
- Produce weld samples in various positions with the GMAW, FCAW and SMAW processes to acceptable criteria
  - Welding techniques
  - Identify compatible welding filler material and shielding gases
- Interpret various welding codes and standards
  - Terms and definitions
  - Welding symbols

## Lab Content

- Practice of safe welding skills using the GMAW, FCAW, and SMAW welding process for various base materials.
- Reinforcement of knowledge for set up, safe use and some maintenance of welding equipment.

## Special Facilities and/or Equipment

- Laboratory with sheet metal tools
- Personal protective equipment

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

- Results of written quizzes and tests
- Shop participation
- Comprehensive written final examination
- Comprehensive final project
- Evaluation of progress by weekly assignments

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

- Discussion
- Laboratory instruction
- Demonstration

## Representative Text(s) and Other Materials

International Training Institute. [Welding 1-4, International Training Institute for the Sheet Metal and Air Conditioning Industry \(student manual\)](#). 2005.

This is the standard Sheet Metal textbook/workbook used for this course. Although it may not be within 5 years of the required published date, it is the most current book used when teaching this course.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- Reading assignment:
  - Read text pages assigned explaining written welding symbols
- Writing assignment:
  - Complete a quiz, including sketches and written answers, regarding proper machine set up for SMAW welding

## **Discipline(s)**

Sheet Metal