

EL CAMINO COLLEGE

COURSE OUTLINE OF RECORD

I. Course Information

Course Acronym:*

WELD

Course Number:* 40C

Descriptive Title:* Advanced Gas Tungsten Arc Welding (GTAW) Skills Lab

Division: Industry and Technology

Department:*

Welding

Course Disciplines: Welding

Catalog Description:*

This course is designed to develop the advanced specialized skills used within the structural steel, sheet metal and aerospace manufacturing industries using the Gas Tungsten Arc Welding (GTAW) process. Repair of cast welding and tooling maintenance will be introduced. Students will develop various specialized skills that will help them achieve students' goals and attain the necessary traits that employers are seeking. This course prepares students for American Welding Society (AWS) D17.1 certification.

Conditions of Enrollment:

Prerequisite: Welding 40B with a minimum grade of C or equivalent

Co-requisite:

Recommended Preparation:

Enrollment
Limitation:

Course Length: Full Term

Hours Lecture (per
week): 0

Hours Laboratory (per
week): 6

Outside Study Hours:* 0

Total Course Hours:* 108

Course Units:* 2

Grading Method: Letter Grade and Pass/No Pass

Credit Status: Credit, non degree applicable

Transfer CSU: Yes

Effective Date: 02/18/2014

Transfer UC: No

Effective Date:

General Education:
ECC

Term:

Other:

CSU GE:

Term:

Other:

IGETC:

Term:

Other:

II. Outcomes and Objectives

A. Student Learning Outcomes (SLOs) (The course student learning outcomes are listed below.)
SLO revisions are completed via the SLO Change Form available on the College Curriculum Committee website.

Student Learning
Outcomes:

SLO #1

Apply the proper safety procedures and precautions required when working with GTAW.

SLO #2

Use the appropriate equipment and materials to develop the welds and weld joints illustrated on a job sheet.

SLO #3

Produce a quality "out of position" weldment and adjust his welding parameters accordingly.

B. Course Objectives (The major learning objective for in this course are listed below.)

Course Objectives:

1. Distinguish between properties of different metals and identify them.
2. Demonstrate proper safety precautions when working with GTAW.
3. Set up the needed power sources, shielding gases, torch, nozzles and tungsten electrodes used in GTAW.
4. Prepare weld joints and perform various welds in all positions.
5. Use the appropriate equipment and materials to develop the welds and weld joints illustrated on a job sheet.
6. Demonstrate fabrication and maintenance principles in construction of a product using GTAW.
7. Demonstrate proper base metal and bead qualification procedures per requirements set by the American Welding Society (AWS) D17.1.

III. Outline of Subject Matter

(Topics should be detailed enough to enable an instructor to determine the major areas that should be covered to ensure consistency from instructor to instructor and semester to semester.)

Example:

- I. Main Topic (3 hours, lecture)
 - A. Sub topics
 - B. Sub topics
 1. Super sub topic
 2. Super sub topic

Major Topics:

I. WELDING EQUIPMENT PROCEDURES (2 hours, lab)

- A. Set up, adjust, operate and shut down GTAW equipment
- B. Safety precautions
- C. Correct welding parameters

II. EFFECTS OF WELDER VARIABLES (14 hours, lab)

- A. Configuration of torch angle to joint
- B. Configuration of push angle and filler metal
- C. Arc heat generation

III. CAUSES OF DISCONTINUITIES (16 hours, lab)

- A. Formulating corrective action
- B. Welders controlled parameters

IV. ADJUSTING VISUAL DEFECTS (14 hours, lab)

- A. Recognizing effect of heat input
- B. Characteristics of base metal
- C. Joint fit-up

V. NON-DESTRUCTIVE TESTING (8 hours, lab)

- A. Dye penetrate
- B. Mag particle

VI. COMPLETE JOINT PENETRATION (CJP) BUTT JOINT (12 hours, lab)

- A. Aluminum
- B. Carbon steel
- C. Stainless steel

VII. CONTROLLING BEAD SIZE ON TEE JOINT (20 hours, lab)

- A. Aluminum
- B. Carbon steel

C. Stainless steel

VIII. REPAIRING CAST IRON (12 hours, lab)

A. Preheat/postheat

B. Joint fit-up

C. Filler metal selection

IX. PREPARING FOR INDUSTRY AWS D17.1 EXAM (10 hours, lab)

A. Tee joint

B. CJP butt joint

C. Base metal thickness variations

D. Reviewing industry needs and standards

Total Lecture Hours: 0

Total Laboratory Hours: 108

Total Hours: 108

IV. Primary Method of Evaluation and Sample Assignments

A. Primary Method of Evaluation (choose one):

- 1) Substantial writing assignments
- 2) Problem solving demonstrations (computational or non-computational)
- 3) Skills demonstrations

Primary Method of Evaluation: 3) Skills demonstration

B. Typical Assignment Using Primary Method of Evaluation

Typical Assignment Using Primary Method of Evaluation: On a weldment, demonstrate proper base metal and bead qualification per AWS D17.1 requirements. Submit weldment to the instructor.

C. College-level Critical Thinking Assignments

Critical Thinking Assignment 1: Differentiate between an acceptable full penetration weldment and one that would qualify for rejection. Report findings on a one-page lab report and submit to the instructor.

Critical Thinking Assignment 2: On a weldment, visually examine the cover pass and identify defects of the pass. Report findings on a one-page lab report and submit to the instructor.

D. Other Typical Assessment and Evaluation Methods

Examples: Class Performance, Objective Exam, Clinical Evaluation, Oral Exams, Completion, Other Exams, Embedded Questions, Performance Exams, Essay Exams, Presentation, Fieldwork, Quizzes, Homework Problems, Reading Reports, Journal kept throughout course, Term or Other Papers, Laboratory Reports, True/False, Matching Items, Written Homework, Multiple Choice, Other (specify)

Other Evaluation Methods: Class Performance
Objective Exam
Performance Exams

V. Instructional Methods

Examples: Lecture, Group Activities, Lab, Role play/simulation, Discussion, Guest Speakers, Multimedia presentations, Field trips, Demonstration, Other (specify)

Instructional Methods: Demonstration
Discussion
Group activities
Lab

If other:

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. Work Outside of Class

Work Outside of Class:* This course is a lab course and does not require work outside of class.

If Other:

VII. Texts and Materials

A. Up-to-date Representative Textbooks: Please use the following format(s):

Printed Text - Author, Title, Edition, Publisher, Year.

Digital Text (OER Text) - Author (last name first). Title. Edition or Version (if beyond 1st). Publisher, Publication year or Revision date. URL. License.

Sample: Dillon, Dave. *Blueprint for Success in College and Career. Version 1.3.* Rebus Community, 2018. press.rebus.community/blueprint2/. Licensed under CC BY 4.0.

If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.

***Multiple textbooks may be listed.**

Up-To-Date Representative Textbooks: Hobart Institute of Welding Technology, [GAS TUNGSTEN ARC WELDING \(EW-369 TECHNICAL GUIDE\)](#), Hobart Institute of Welding Technology, 2010. (Discipline Standard)

Hobart Institute of Welding Technology, [GAS TUNGSTEN ARC WELDING \(EW-470 TECHNICAL GUIDE\)](#), Hobart Institute of Welding Technology, 2002. (Discipline Standard)

B. Alternative Textbooks: Please use the following format(s): if applicable

Printed Text - Author, Title, Edition, Publisher, Year.

Digital Text (OER Text) - Author (last name first). Title. Edition or Version (if beyond 1st). Publisher, Publication year or Revision date. URL. License.

Sample: Dillon, Dave. *Blueprint for Success in College and Career. Version 1.3.* Rebus Community, 2018. press.rebus.community/blueprint2/. Licensed under CC BY 4.0.

If you wish to list a text that is more than 5 years old, please annotate it as a “discipline standard”.

***Multiple textbooks may be listed.**

Alternative Textbooks:

C. Required Supplementary Readings

Required Supplementary Readings: AWS D17.1 supplements
Lincoln educational materials

D. Other Required Materials

Other Required Materials: Notebook
Gloves
Safety glasses
Protective clothing
Welding helmet
Stainless steel brush
Pliers

VIII. Conditions of Enrollment

A. Requisites (Course Prerequisites and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

Requisite: Prerequisite

Category: sequential

Requisite course(s): Welding 40B
List both prerequisites and corequisites in this box.

Requisite and Matching skill(s): **Bold the requisite skill.**
List the corresponding course objective under each skill(s).

Ability to use GTAW welding equipment safely.

WELD 40B -Set up and operate to specific welding parameters and procedures used in the aerospace industry.

WELD 40B -Understand welding theory and proper application of GTAW.

Ability to adjust variables for in and out of position welds.

WELD 40B - Demonstrate the ability to weld low carbon steel, stainless steel and aluminum using lap joints and tee joints in GTAW.

Capable of making adjustments to amperage and polarity of GTAW equipment according to base metal characteristics.

WELD 40B - Weld in increasingly difficult conditions in order to develop the necessary welding skills mirroring those in the aerospace industry.

WELD 40B - Understand welding theory and proper application of GTAW.

Ability to weld joints using GTAW equipment.

WELD 40B - Produce sound gas tungsten arc welded joints in both steel and aluminum.

Ability to weld various metals using GTAW equipment.

WELD 40B - Demonstrate the ability to weld low carbon steel, stainless steel and aluminum using lap joints and tee joints in GTAW.

B. Requisite Skills: (Non-Course Prerequisite and Corequisites) Skills needed without which a student would be highly unlikely to succeed.

Requisite Skill: or equivalent

Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable

If students have not taken Welding 40B but have taken an equivalent course at another college or have intermediate skills in gas tungsten arc welding, they will be prepared to take this course. Without the knowledge of distortion control and the implementation of Welding Procedure Specification skills, a student is unlikely to succeed in the course.

C. Recommended Preparations (Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite course:

Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).

D. Recommended Preparation (Non-Course) (Skills with which a student's ability to succeed will be strongly enhanced.)

Requisite Skill:

Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable

E. Enrollment Limitations

Enrollment Limitations and Category:

Enrollment Limitations Impact:

Course Created by: Renee Newell

Date: 11/19/2013

Original Board Approval Date: 02/18/2014

Last Reviewed and/or Revised by: Nick Colin

Date: 05/10/2023

Last Board Approval Date: 11/20/2023 effective FALL 2024