



El Camino College  
COURSE OUTLINE OF RECORD – Official

<b>Subject:</b>	WELD
<b>Course Number:</b>	45
<b>Descriptive Title:</b>	Structural Fabrication
<b>Division:</b>	Industry and Technology
<b>Department:</b>	Welding
<b>Course Disciplines:</b>	Welding
<b>Catalog Description:</b>	This welding course focuses on skills required to fabricate a project from an engineering drawing to the finished product. Emphasis is placed on metal fabrication and iron working equipment, the proper use of tools and equipment, relevant math skills and shop safety.
<b>Prerequisite:</b>	Welding 10A or Welding 15 or Welding 40A with a minimum grade of C in prerequisite
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	4
<b>Hours Laboratory (per week):</b>	4
<b>Outside Study Hours:</b>	8
<b>Total Hours:</b>	144
<b>Course Units:</b>	5
<b>Grading Method:</b>	Letter Grade only
<b>Credit Status:</b>	Credit, degree applicable
<b>Transfer CSU:</b>	Yes
<b>Effective Date:</b>	Prior to July 1992
<b>Transfer UC:</b>	No
<b>Effective Date:</b>	
<b>General Education:</b>	
<b>ECC</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>CSU GE:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>IGETC:</b>	

<b>Term:</b>	
<b>Other:</b>	
<b>Student Learning Outcomes:</b>	<p><b>SLO #1 Safe Setup and Operation</b></p> <p>Students will be able to demonstrate the safe set up and use of various welding and cutting apparatus.</p> <p><b>SLO #2 Job Skills</b></p> <p>Students will be prepared to demonstrate job skills required for fabrication layout.</p> <p><b>SLO #3 Measuring Tools</b></p> <p>Students will be able to correctly use measuring tools necessary for fabrication projects.</p>
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Distinguish between working drawings, detail drawings, assembly drawings, and erection drawings, visible object lines, hidden lines, center lines, cutting plane lines, phantom lines, dimension and extension lines.</li> <li>2. Demonstrate the use of proper instruments to produce templates and measure parts to specified tolerances.</li> <li>3. Calculate basic mathematical operations to properly fit up weldments.</li> <li>4. Miter cut square tubing to fabricate 3 inch cube - compensate for warpage, distortion, and shrinkage due to welding.</li> <li>5. Utilize cutting, bending, notching and various forming equipment to fabricate metal assembly parts.</li> </ol>
<b>Major Topics</b>	<p><b>I. WELDING SAFETY AND THE WELDING INDUSTRY (2 hours, lecture)</b></p> <p>A. Personal protective equipment</p> <p>B. Occupational safety</p> <p>C. Career opportunities</p> <p><b>II. WELDING SAFETY AND THE WELDING INDUSTRY (2 hours, lab)</b></p> <p>A. Personal protective equipment</p> <p>B. Occupational safety</p> <p><b>III. SHOP MATH (2 hours lecture)</b></p> <p>A. Reading scale measurements</p> <p>B. Adding and subtracting fractions</p> <p><b>IV. AWS SYMBOL REVIEW (2 hours lecture)</b></p>

A. Non Destructive Examination (NDE)  
symbols

B. Fillet/groove symbol terminology

**V. NON DESTRUCTIVE TESTING (NDT) (8 hours, lab)**

A. Testing procedures

B. Engineering drawings

C. Cube assembly according to shop  
drawing.

**VI. METALLURGY (8 hours, lecture)**

A. Physical properties of materials

B. Material fabrication

**VII. FABRICATION PROJECTS (40 hours, lab)**

A. Square tube cube

B. Round bar welded into 3D hexagon circle

C. Pipe bending

D. Ornamental work

**VIII. PROPER SET UP (14 hours, lecture)**

A. The effects of heat

1. Warpage
2. Distortion
3. Shrinkage

B. Effective use of set-up tools

1. Vee block, angle block, square
2. Modular fixturing tables
3. Calipers, straight edge

**IX. WRITING WELD PROCEDURE SPECIFICATIONS (WPS),  
(4 hours, Lecture)**

A. Introduction of weld procedures

B. AWS Code Book references used in WPS

**X. FORMING EQUIPMENT (16 hours, lecture)**

A. Semi-automatic equipment

	<p>B. Hydraulic equipment</p> <p>C. Tube bending and notching equipment</p> <p>D. Plate roller</p> <p><b>XI. EXPLORING IRON WORKING EQUIPMENT (22 hours, lab)</b></p> <p>A. Hand tools</p> <p>B. Semi automated equipment</p> <p>C. Automated equipment</p> <p>D. Ornamental work</p> <p>E. Pipe bending</p> <p><b>XII. INTRODUCTION TO THE TORCHMATE PLASMA TABLE (24 hours, lecture)</b></p> <p>A. Name plate</p> <p>B. Details for geometry</p> <p>C. Transferring an image</p>
<b>Total Lecture Hours:</b>	72
<b>Total Laboratory Hours:</b>	72
<b>Total Hours:</b>	144
<b>Primary Method of Evaluation</b>	3) Skills demonstration
<b>Typical Assignment Using Primary Method of Evaluation:</b>	Use proper measuring devices, cutting and forming equipment to produce a detailed weldment. Submit weldment to the instructor.
<b>Critical Thinking Assignment 1:</b>	Analyze a welded assembly drawing and determine the tasks required to complete the assembly. Generate a one to two page written report which outlines materials needed, templates to be produced, fixture set ups, and equipment essential to fabricating the assembly. Submit report to the instructor.
<b>Critical Thinking Assignment 2:</b>	Using an engineering drawing, calculate the minimum and maximum allowable tolerances needed for fit-up. Report calculations on a one-page lab report and submit to the instructor.
<b>Other Evaluation Methods:</b>	Class Performance Completion Homework Problems Multiple Choice Other Exams

	Performance Exams Quizzes True/False Written Homework
<b>Instructional Methods:</b>	Demonstration Field trip Lab Lecture Multimedia presentations
<b>If other:</b>	
<b>Work Outside of Class:</b>	Observation of or participation in an activity related to course content (such as theatre event, museum, concert, debate, meeting) Problem solving activity Required reading Skill practice Study
<b>If Other:</b>	
<b>Up-To-Date Representative Textbooks:</b>	NO TEXTBOOK IS REQUIRED.
<b>Alternative Textbooks:</b>	
<b>Required Supplementary Readings:</b>	American Welding Society, <u><a href="#">AWS D1.1 Structural Welding Code - Steel</a></u> , 24th edition, American Welding Society, 2020
<b>Other Required Materials:</b>	
<b>Requisite:</b>	Prerequisite
<b>Category:</b>	sequential
<b>Requisite course(s): List both prerequisites and corequisites in this box.</b>	Welding 10A or Welding 15 or Welding 40A
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	<p><b>Safely operate welding equipment.</b></p> <p>WELD 10A - Safely operate SMAW equipment.</p> <p>WELD 15 - Demonstrate safety procedures for safe operation of tools, machines and welding equipment</p> <p>WELD 40A - Complete a welding safety test covering the operation of tools, machines and equipment.</p> <p><b>Create a weldment using proper set-up of a welding process.</b></p> <p>WELD 10A - Weld in the flat, horizontal, vertical or overhead position.</p> <p>WELD 15 - Demonstrate competency in shielded metal arc welding to produce tee joints</p>

	in the horizontal and flat positions.  WELD 40A - Perform GTAW on ferrous and nonferrous alloys, welding various joints in all positions.
<b>Requisite:</b>	
<b>Requisite and Matching Skill(s): Bold the requisite skill(s). If applicable</b>	
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<b>Enrollment Limitations and Category:</b>	
<b>Enrollment Limitations Impact:</b>	
<b>Course Created by:</b>	George Rodriguez
<b>Date:</b>	09/01/1990
<b>Original Board Approval Date:</b>	02/11/1991
<b>Last Reviewed and/or Revised by:</b>	Renee Newell
<b>Date:</b>	05/18/2021
<b>Last Board Approval Date:</b>	06/21/2021 effective FALL 2022