

# WELD 0001B - PRINCIPLES OF FABRICATION

## Catalog Description

Formerly known as WELD 70

Prerequisite: Completion of WELD 1A and completion of WELD 2A, WELD 3B or WELD 5A with grades of "C" or better

Hours: 72 (18 lecture, 54 laboratory)

Description: Foundation fabrication course includes elements of design and fabrication methods, tool and equipment utilization, materials planning, and print reading. Designed for welding students wanting to learn the foundation skills of steel fabrication and construction process. (not transferable)

## Course Student Learning Outcomes

- CSLO #1: Explain safety standards for both learning and work site environments with focus on metal fabrication equipment used in the construction of a chosen student project.
- CSLO #2: Define terms related to this course: fixture, model, tolerance, buck, annealed state, cold work, drawing quality steel, fixture, distortion, shrinkage.
- CSLO #3: Execute a guided planned project, plan materials, layout and fabrication, final assembly and finish.

## Effective Term

Fall 2019

## Course Type

Credit - Degree-applicable

## Contact Hours

72

## Outside of Class Hours

36

## Total Student Learning Hours

108

## Course Objectives

Lecture Objectives:

1. Explain safety practices.
2. Evaluate parts to be fabricated from blueprint.
3. Explain techniques, methods, and equipment used in forming fabricated projects.
4. Compare hand forming tools to machine equipment.
5. Identify weld symbols and the required weld needed and apply welding terms as applicable.
6. Interpret possible sub-assembly components.
7. Compare the steps and determine the best assembly sequence.
8. Review measurement with focus on the addition and subtraction of common and decimal fractions.
9. Translate the effect of how tolerance influences the process of fabrication.

10. Explain angle development, measurement methods and use of protractors.

11. Describe pattern development.

12. Describe bends, stretch outs, and economical layout.

13. Compute geometric measure, shapes, and volumes.

14. Analyze project planning procedures (i.e., design, cost, time, fabrication, finish and installation).

Laboratory Objectives:

1. Practice habits of safety in the lab/shop setting.

2. Use personal protective equipment devices, and best industry practices.

3. Employ safe practices when using related welding, cutting, grinding and finishing equipment.

4. Demonstrate metal forming methods and equipment.

5. Utilize jigs and fixtures.

6. Employ typical layout for best material usage per parts listed on prints.

7. Determine welding requirement for fabrication of parts.

8. Organize project components to be made first to facilitate subassemblies.

9. Analyze the available selection of equipment and methods of cutting and fitting.

10. Utilize measuring equipment and math process in the construction of student project.

11. Demonstrate fabrication steps of assembly.

12. Explain how tolerances play a role in the successful outcome.

13. Determine the space needed for fabrication during welding so that the welds do not become removed during the grinding and finishing steps.

14. Apply mathematical processes as needed for each student project for the calculation of lengths, area, squaring, angles, bend radius, and tolerances.

## General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

## Articulation Information

## Methods of Evaluation

- Projects
  - Example: 1. Students will perform the assigned initial project, for example picture frame. Students will be assessed based on dimensions tolerance, fit and finish to industry standards.
  - 2. Students will choose from one of three assigned projects, for example table construction, from the project manual or hand outs. Plan materials, do layout, cut/fit components, sub-assemblies, and final assembly. Project will be assessed based on industry standards.

## Repeatable

No

## Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Instructor will advise and assist students with the fabrication method sequence of component development, sub-assembly process, and final assembly. (Laboratory Objective 2)
2. Instructor demonstration followed by student application of tubing roller, bead former, tubing bender.

#### Lecture:

1. Instructor will present welding symbols and blueprint drawings to industry standard. Students will be given assignments to apply symbols in their own blueprints.

#### Distance Learning

1. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

- Author: Roger Timings
- Publisher: Newnes
- Publication Date: 2008
- Text Edition: 1st
- Classic Textbook?:
- OER Link:
- OER:
- Print Reading for Welding and Fabrication
  - Author: Corgan
  - Publisher: Prentice Hall
  - Publication Date: 2011
  - Text Edition: 1st
  - Classic Textbook?:
  - OER Link:
  - OER:
- Blueprint Reading for Welders
  - Author: A.E. Bennett & Louis J. Siy
  - Publisher: Delmar / Cengage Learning
  - Publication Date: 2010
  - Text Edition: 8th
  - Classic Textbook?:
  - OER Link:
  - OER:

## Typical Out of Class Assignments Reading Assignments

1. Read and summarize welding fabrication procedures and welding joint designs and visual acceptance criteria to welding code.
2. Research material strength and weight and typical applications utilizing steel design criteria and be prepared to discuss in class.

## Writing, Problem Solving or Performance

1. Using the welding manufacture's web sites on projects, calculate materials and time cost.
2. Using the welding manufacture's web sites on projects, create a detailed drawing with welding symbols.

## Other (Term projects, research papers, portfolios, etc.)

1. Perform various welds on the project during assembly and fabrication.

**Other materials and-or supplies required of students that contribute to the cost of the course.**

## Required Materials

- Welding Fabrication and Repair
  - Author: Frank Marlow
  - Publisher: Industrial Press
  - Publication Date: 2002
  - Text Edition: 1st
  - Classic Textbook?:
  - OER Link:
  - OER:
- Modern Welding
  - Author: Althouse, Turnquist, Bowditch, Bowditch, & Bowditch
  - Publisher: Goodheart-Wilcox
  - Publication Date: 2020
  - Text Edition: 12th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Fabrication and Welding Engineering