

Welding

Active as of Fall Semester 2016

I. General Information

1. Course Title:
Welding Trade Knowledge

2. Course Prefix & Number:
WELD 1140

3. Course Credits and Contact Hours:
Credits: 4

Lecture Hours: 3

Lab Hours: 2

4. Course Description:
This course will introduce student to fundamentals skills related to the welding & fabrication trade, which includes safety, fabrication equipment, fabrication techniques, measurement, layout, hand tools, fasteners, thread repair, and shop math. Students create and refine skill sets by producing class projects such as a nut and bolt gauge and electrode holder, which will be utilized in future classes.

5. Placement Tests Required:

6. Prerequisite Courses:
There are no prerequisites for this course.

9. Co-requisite Courses:
[WELD 1160](#) Welding Theory 2

II. Transfer and Articulation

III. Course Purpose

1. Program-Applicable Courses – This course is required for the following program(s):
Welding & Fabrication AAS
Welding & Fabrication Diploma

IV. Learning Outcomes

1. College-Wide Outcomes

College-Wide Outcomes/Competencies	Students will be able to:
Demonstrate interpersonal communication skills	Communicate effectively to compare and contrast project problems.
Apply abstract ideas to concrete situations	Apply practical knowledge to layout from a sketch or drawing.
Work as a team member to achieve shared goals	Function as a team to develop and execute projects.
Discuss/compare characteristics of diverse cultures and environments	Discuss the role of audience how to communicate appropriately.

2. Course Specific Outcomes - Students will be able to achieve the following measurable goals upon completion of the course:

- Explain fraction and decimal relationships with in the US customary measuring system;
- Identify and implement the proper uses of fabrication machinery;
- Determine the proper parameters to create new and repair damaged threads;
- Interpret information to create a bill of materials, weight, and cost of part;
- Complete fabrication layouts with the use of basic hand layout tools;
- Calculate drill and cutting speeds based on material type;
- Demonstrate an understanding of drill geometry, and implement proper sharpening techniques;
- Evaluate fasteners and determine size, grade, and pitch;
- Establish conforming and non-conforming parts through the use of inspection tools;
- Calculate the weight of steel based off its gauge thickness;
- Establish an understanding of the screw extractor processes; and
- Explain the difference between ferrous and non-ferrous materials.

V. Topical Outline

Listed below are major areas of content typically covered in this course.

Lecture Sessions

1. Measurement Units
 - Fractions of an inch
 - Decimals fraction
 - Adding measurement fractions
 - Subtracting measurement fractions
2. Measurement Tools
 - Tape measure and steel ruler
 - Square and centering head
 - Dial calipers
 - Micrometer
 - Pitch gage
 - Radius gage
 - Protractor
3. Layout Principles
 - Corner reference
 - Symmetrical
 - Calculating hole locations
 - Layout of triangular gussets
4. Inspection
 - Surface plate
 - Height gage
 - Angle plates
 - V-blocks

- Calculation of inspection dimensions
- 5. Structural metals
 - Dimensions of structural shapes
 - Weights of structural shapes
 - Calculating bill of materials
 - Calculating weight
- 6. Soldering and Brazing
 - Copper pipe
 - Oxy-acetylene brazing
- 7. Grinding
 - Machine grinders
 - Hand grinders
 - Abrasives
 - Basic operations
- 8. Metal Shear
 - Knife clearance
 - Back gage
 - Basic operations
- 9. Iron Worker
 - Capacity calculations
 - Punching
 - Notching attachments
 - Basic operations
- 10. Saws and Cut-Off Machines
 - Horizontal band saws
 - Vertical band saws
 - Abrasive saw
 - Cold saw
- 11. Drills and Drilling Machines
 - Hand drills
 - Drill press
 - Drill geometry
 - Drill sharpening
 - Drill RPM
- 12. Fasteners
 - Standard
 - Metric
 - Grade
 - Pipe thread
 - Pop rivets
 - Flaring
- 13. Hand Threading
 - Diameter and pitch
 - Tap drill
 - Taps
 - Dies
 - Tap operations
- 14. Milling Machine
 - Squaring the head
 - Digital read out
 - Basic operation
 - Speeds and feeds
 - Power tapping
 - End mills
- 15. Metal Lathe
 - Cutters

- Speeds and feeds
- Tail stock
- Basic operations
- 2. Laboratory/Studio Sessions
 - 1. Shop Fundamentals
 - Demonstrate safety procedures
 - Demonstrate measuring procedures
 - Identify hand tools
 - Identify cutting hand tools
 - Interpret Drawings
 - Demonstrate layout procedures
 - Interpret specifications and instructions
 - Operate fabrication machinery
 - 2. Nut and Bolt Gauge
 - Bill of material
 - Layout
 - Drill and tap
 - Assembly
 - 3. Copper Pipe
 - Pipe cutter
 - Joint prep
 - Heat control
 - 4. Drill Sharpening
 - Point angle
 - Cutting lip length
 - Cutting relief
 - 5. Fasteners
 - Standard bolts
 - Metric bolts
 - Rivets
 - 6. Bracket fabrication
 - Plate layout
 - Drill selection
 - Inspection

VI. Textbook and Supplemental Reading Materials

Larry Jeffus, *Welding Principles and Applications*