Las Positas College
3000 Campus Hill Drive
Livermore, CA 94551-7650
(925) 424-1000
(925) 443-0742 (Fax)

Course Outline for WLDT 63

WELDING LAYOUT AND FITTING

Effective: Spring 2018

I. CATALOG DESCRIPTION:
WLDT 63 — WELDING LAYOUT AND FITTING — 2.00 units

Interpretation of welding blueprints by making welding layouts and weldment fitups. Current methods, practices, and recommended procedures. Use of jigs, fixtures, holding devices, and welding sequences. Methods of straightening and restoring dimensions to finished product. Laboratory includes SMAW, GMAW, GTAW, and FCAW welding, plasma and oxy-fuel cutting.

1.00 Units Lecture 1.00 Units Lab

Strongly Recommended
WLDT 61BL - Advanced SMAW and FCAW Skills Lab
with a minimum grade of C
or

WLDT 62BL - Advanced GTAW and GMAW Skills Lab
with a minimum grade of C

Grading Methods:
Letter or P/NP

Discipline:
- Welding

	MIN
Lecture Hours:	18.00
Lab Hours:	54.00
Total Hours:	72.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering this course, it is strongly recommended that the student should be able to:

A. WLDT61BL
1. Demonstrate and describe safe use of advanced equipment associated with:
   a. Shielded Metal Arc Welding (SMAW);
   b. Flux-core Arc Welding (FCAW)
   c. Plasma cutting
   d. Oxy-fuel cutting
   e. Carbon arc cutting
2. Describe the uses and limitations of each process;
3. Classify proper electrode and wire selection for applications;
4. Recognize common metals;
5. Demonstrate FCAW, SMAW welded plate steel in the horizontal, vertical and overhead positions to AWS specifications;
6. Perform circumferential welds in all positions;
7. Operate plasma and oxy-fuel cut manually in all positions;
8. Identify and practice safe practices in the welding shop;
9. Use advanced blueprints to make parts;
10. Safely operate advanced welding support equipment.

B. WLDT62BL
1. Identify and demonstrate safe use of advanced equipment associated with
   a. Gas Tungsten Arc Welding (GTAW)
   b. Gas Metal Arc Welding (GMAW)
   c. Plasma cutting
   d. Oxy-fuel cutting
   e. Carbon arc cutting
2. Catalog the uses and limitations of each process;
3. Categorize proper electrode and wire selection for application;
4. Identify common metals;

5. Demonstrate GTAW, GMAW welded non-ferrous alloys in all positions to AWS specifications;
6. Demonstrate plasma and oxy-fuel cut manually in all positions;
7. Employ oxy-fuel cutting with a shape cutting machine;
8. Specify and apply safe practices in the welding shop;
9. Translate advanced blueprints to make parts;
10. Operate safely advanced welding support equipment.

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Interpret and apply welding blueprints;
B. Illustrate welding joints and perform material layout;
C. Explain and apply geometric construction;
D. Explain and apply parallel line development;
E. Explain and apply radial line development;
F. Illustrate fit up of components for welding in the proper sequences to standard;
G. Select, understand, and properly use welding jigs, fixtures and holding devices;
H. Illustrate control of weld distortion and defects;
I. Demonstrate proper methods and techniques for straightening;
J. Demonstrate rigging techniques;
K. Material handling safe practices
L. Practice the basics of SMAW, GMAW, GTAW, FCAW, Plasma and oxy-fuel cutting.

V. CONTENT:

A. Use and application of welding blueprints
    1. Assembly drawings
    2. Detail drawings
    3. Sections
    4. Dimensions and tolerances
    5. Bill of materials
B. Weld joint prep and material layout
    1. Grinder
    2. Oxy-fuel
    3. Plasma
    4. Carbon arc
    5. Linear measurements and tools
    6. Angular measurements and tools
    7. Proper joint details and fit-up per AWS codes
C. Geometric construction
    1. English measurements
    2. Metric measurements
    3. Linear dimensions and duplication
    4. Angular dimensions and duplication
    5. Construction of basic geometric shapes
    6. Basic trigonometry
D. Parallel line development
    1. Use in round pipe tubing and ducting
    2. use in square and rectangular tubing and ducting
E. Radial line development
    1. Cone layout
    2. Square and rectangular chutes and hoppers
    3. Square to round transitions
F. Correctly fit-up components for welding in the proper sequences
    1. Project planning
    2. Dimensional control
    3. Angular control
    4. Planning for access
    5. Welding positions
G. Select, understand, and properly use welding jigs, fixtures and holding devices
    1. Welding jigs and fixtures
    2. Welding platens
    3. Wedges and dogs
    4. Screw clamps
    5. Hydraulic clamps and jacks
    6. Pneumatic clamps and jacks
H. Control weld distortion and defects
    1. Prebending
    2. Distortion control using localized heat
    3. Stress relief and normalizing
    4. Welding
I. Proper methods and techniques for straightening
    1. Hand tools
    2. Heat
    3. Pressure
    4. Machine allowance
J. Rigging
    1. Wire rope
    2. Nylon slings
    3. Chains
    4. Eye bolts
    5. Shackles
    6. Pad eyes
    7. Center of gravity
    8. Bridge cranes
    9. Jib cranes
    10. Gantry cranes
    11. Mobile cranes
    12. Tower cranes
K. Material handling safety

1. Forklift use
2. Safe lifting techniques
3. Dunnage
4. Slings

L. Welding and cutting basics
1. SMAW
2. GMAW
3. GTAW
4. FCAW
5. Plasma cutting
6. Oxy-fuel cutting

VI. METHODS OF INSTRUCTION:

A. **Lecture** -
B. Visual presentations
C. **Field Trips** -
D. Invited guests
E. **Demonstration** -

VII. TYPICAL ASSIGNMENTS:

A. Read chapter related to radial line development
B. Discuss the chapter content
C. Use the information in the chapter to layout and form a cone in lab

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Projects
3. Class Participation
4. Class Work
5. Home Work
6. Lab Activities

B. **Frequency**

1. Exams once per semester
2. Projects on an as assigned basis
3. Participation will be evaluated daily
4. Work samples will be submitted for grading as completed over the duration of the semester
5. Homework as assigned
6. Lab safety and proper use of tools will be evaluated on a daily basis

IX. TYPICAL TEXTS:

1. American Welding Society (2012). *SPECIFICATION FOR WELDING PROCEDURE AND PERFORMANCE QUALIFICATION* (2012 ed.). Miami, Florida: American Welding Society.
2. Jeffus, L. (2012). *Welding Principles and Practices* (7th ed.). Tinley Park , IL: Goodheart-Willcox Company.
3. American Welding Society (2015). *Welding Inspection Technology* (2015 ed.). Miami, Florida: American Welding Society.
4. Brown, W., & Brown, R. (2016). *Print Reading for Industry* (10th ed.). Tinley Park , IL: Goodheart-Willcox Company.
5. Hoffman, D., Dahle, K., & Fisher, D. (2017). *Welding* (2nd ed.). London, UK: Pearson.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Personal protective equipment
B. Welding gloves
C. Welders safety glasses
D. Leather boots or shoes
E. Tungsten
F. Calculator with Trig functions