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### Course Outline for WLDT 62BL

#### ADVANCED GTAW AND GMAW SKILLS LAB

Effective: Spring 2018

#### I. CATALOG DESCRIPTION:

WLDT 62BL — ADVANCED GTAW AND GMAW SKILLS LAB — 2.00 units

Advanced skills in Gas Tungsten Arc (GTAW) and Gas Metal Arc (GMAW) welding of ferrous and non-ferrous alloys in the horizontal, vertical and overhead positions to A.W. S. codes. Safety and proper use of TIG and MIG equipment, oxy-fuel welding and cutting, plasma cutting. Blueprint usage in welding shop environment. Pipe and tubing fit-up and welding.

2.00 Units Lab

#### Prerequisite

WLDT 62AL - Beginning GTAW and GMAW Skills Lab  
with a minimum grade of C

#### Corequisite

WLDT 62A - Beginning GTAW and GMAW Theory  
or

WLDT 62B - Advanced GTAW and GMAW Theory

#### Grading Methods:

Letter or P/NP

#### Discipline:

- Welding

	<u>MIN</u>
<b>Lab Hours:</b>	108.00
<b>Total Hours:</b>	108.00

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

#### III. PREREQUISITE AND/OR ADVISORY SKILLS:

**Before entering the course a student should be able to:**

##### A. WLDT62AL

1. Identify and safely use equipment associated with:
2. Gas Tungsten Arc Welding (GTAW)
3. Gas Metal Arc Welding (GMAW)
4. Plasma cutting
5. Oxy-fuel cutting
6. Carbon arc cutting
7. Identify the uses and limitations of each process;
8. Identify proper electrode and wire selection for application;
9. GTAW, GMAW weld sheet and plate steel in the flat and horizontal positions to AWS specifications;
10. Circumferential welds in flat and rolled position;
11. Understand the uses and limitations of Constant Current and Constant Voltage power sources;
12. Plasma and oxy-fuel cut manually
13. Oxy-fuel cut with a machine;
14. Know and identify safe practices in the welding shop;
15. Know common shop hazards with respect to materials;
16. Use simple blueprints to make parts;
17. Safely operate welding support equipment:
18. Grinder
19. Saw

#### IV. MEASURABLE OBJECTIVES:

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

- A. Identify and demonstrate safe use of advanced equipment associated with
  1. Gas Tungsten Arc Welding (GTAW)

2. Gas Metal Arc Welding (GMAW)
  3. Plasma cutting
  4. Oxy-fuel cutting
  5. Carbon arc cutting
- B. Catalog the uses and limitations of each process;
- C. Categorize proper electrode and wire selection for application;
- D. Identify common metals;
- E. Demonstrate GTAW, GMAW welded non-ferrous alloys in all positions to AWS specifications;
- F. Illustrate circumferential welds in all positions;
- G. Explain the uses and limitations of constant Current and Constant Voltage power sources;
- H. Demonstrate plasma and oxy-fuel cut manually in all positions;
- I. Employ oxy-fuel cutting with a shape cutting machine;
  - J. Specify and apply safe practices in the welding shop;
  - K. Translate advanced blueprints to make parts;
  - L. Operate safely advanced welding support equipment.

#### V. CONTENT:

- A. Advanced equipment associated with each welding/cutting process covered
- B. Uses and limitations of each process covered
- C. Electrode and wire selection for different applications
- D. Common metals
- E. GTAW and GMAW welded non-ferrous alloys in all positions to AWS specifications
- F. Circumferential welds in all positions
- G. Welding power supplies, AC and DC, constant current and constant voltage
- H. Plasma and oxy-fuel cutting in all positions

  - I. Machine cutting of shapes
  - J. Safe handling and use
    1. Gas Tungsten Arc Welding (GTAW)
    2. Gas Metal Arc Welding (GMAW)
    3. Oxy-fuel cutting
    4. Plasma cutting
    5. Carbon arc cutting
  - K. Advanced blueprint usage in the welding shop
  - L. Advanced welding support equipment safe use and application

#### VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Discussion** -
- C. Group demonstration
- D. Visual aids
- E. One-on-one, hands-on instruction
- F. Correlation with real world industrial applications

#### VII. TYPICAL ASSIGNMENTS:

- A. Welding samples using different welding processes
  1. Gas Tungsten Arc Welding (GTAW)
  2. Gas Metal Arc Welding (GMAW)
- B. Welding samples using different welding joints
  1. Butt joint
  2. Tee joint
  3. Lap joint
  4. Corner joint
  5. Edge joint
- C. Welding samples using different positions
  1. Horizontal
  2. Vertical
  3. Overhead
- D. Welding Samples using different materials
  1. Aluminum
  2. Copper
  3. Magnesium
  4. Nickel
  5. Titanium
- E. Cutting samples using hand held oxy-acetylene cutting torch
- F. Cutting samples using semi-automated oxy-acetylene cutting torch
- G. Cutting samples using hand held plasma arc cutting torch

#### 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. Jeffus, L. (2012). *Welding Principles and Practices* (11th ed.). Clifton Park, NY: Delmar.
2. American Welding Society (2012). *SPECIFICATION FOR WELDING PROCEDURE AND PERFORMANCE QUALIFICATION* (2012 ed.). Miami, Florida: American Welding Society.

3. American Welding Society (2015). *Structural Welding Code - Steel* (2015 ed.). Miami, Florida: American Welding Society.
4. Bowditch, W.A., Bowditch, K.E., & Bowditch, M.A. (2017). *Welding Fundamentals* (5th ed.). Tinley Park , IL: Goodheart-Willcox Company.
5. Brown, W., & Brown, R. (2016). *Print Reading for Industry* (10th ed.). Tinley Park , IL: Goodheart-Willcox Company.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Welding Helmet (preferred)
- B. Personal Protective Equipment
- C. Safety Glasses (ANSI Z87.1)
- D. Leather welding gloves
- E. Long sleeve shirt or jacket
- F. Leather shoes or boots