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Course Outline for WLDT 68
CERTIFICATION PREPARATION
Effective: Spring 2018

I. CATALOG DESCRIPTION:

WLDT 68 — CERTIFICATION PREPARATION — 2.00 units

Welding skills preparation for certification testing. Theory of American Welding Society D1.1, American Society of Mechanical Engineers Section IX and American Petroleum Institute 1104

2.00 Units Lab

Strongly Recommended

WLDT 61AL - Beginning SMAW and FCAW Skills Lab
with a minimum grade of C
or

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

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

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

WLDT 69A - Beginning Pipe Welding
with a minimum grade of C
or

WLDT 69B - Advanced Pipe Welding
with a minimum grade of C

Grading Methods:

Letter or P/NP

Discipline:

- Welding

	MIN
Lab Hours:	108.00
Total Hours:	108.00

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. WLDT61AL

1. Identify and demonstrate safe use of basic equipment associated with:
 - a. Shielded Metal Arc (SMAW)
 - b. Flux Core Arc (FCAW)
 - c. Plasma cutting
 - d. Oxy-fuel cutting
 - e. Carbon arc cutting
2. Illustrate the uses and limitations of each process
3. Employ proper electrode and wire selection for application
4. Practice FCAW, SMAW welded plate steel in the flat and horizontal positions to AWS specifications
5. Apply circumferential welds in flat and rolled position
6. Specify the uses and limitations of Constant Current and Constant Voltage power sources

7. Practice Plasma and oxy-fuel cutting manually
 8. Employ Oxy-fuel cutting with a machine
 9. Identify and demonstrate safe practices in the welding shop
 10. Operate the following welding support equipment safely:
 - a. Grinder
 - b. Saw
- B. 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. Demonstrate FCAW, SMAW welded plate steel in the horizontal, vertical and overhead positions to AWS specifications;
 5. Perform circumferential welds in all positions;
 6. Outline the uses and limitations of Constant Current and constant voltage power sources;
 7. Operate plasma and oxy-fuel cut manually in all positions;
 8. Employ Oxy-fuel cutting with a shape cutting machine;
 9. Identify and practice safe practices in the welding shop;
 10. Use advanced blueprints to make parts;
 11. Safely operate advanced welding support equipment.
- C. WLDT62AL
1. Identify and safely use 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. Identify the uses and limitations of each process;
 3. Identify proper electrode and wire selection for application;
 4. GTAW, GMAW weld sheet and plate steel in the flat and horizontal positions to AWS specifications;
 5. Circumferential welds in flat and rolled position;
 6. Understand the uses and limitations of Constant Current and Constant Voltage power sources;
 7. Plasma and oxy-fuel cut manually
 8. Oxy-fuel cut with a machine;
 9. Know and identify safe practices in the welding shop;
 10. Know common shop hazards with respect to materials;
 11. Use simple blueprints to make parts;
 12. Safely operate welding support equipment:
 - a. Grinder
 - b. Saw
- D. 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. Demonstrate GTAW, GMAW welded non-ferrous alloys in all positions to AWS specifications;
 5. Illustrate circumferential welds in all positions;
 6. Explain the uses and limitations of constant Current and Constant Voltage power sources;
 7. Demonstrate plasma and oxy-fuel cut manually in all positions;
 8. Employ oxy-fuel cutting with a shape cutting machine;
 9. Specify and apply safe practices in the welding shop;
 10. Translate advanced blueprints to make parts;
 11. Operate safely advanced welding support equipment.
- E. WLDT69A
1. Identify and understand the API and AWS codes specification;
 2. Interpret the blueprint concepts in practical welding application;
 3. Demonstrate fit up and align pipe welding joints, to standard;
 4. Apply pipe joints manually using plasma, oxy-fuel and gouging equipment in accordance with manufacturing standards;
 5. Operate and weld pipes to code specification with proper techniques in rotated flat (1G) and horizontal (2G) position using SMAW, GMAW, FCAW and GTAW processes;
 6. Identify welding pipe discontinuities and defects;
 7. Apply destructive and non-destructive welding test evaluations;
 8. Employ welder performance tests in 1G and 2G using one of the four welding processes mentioned above.
- F. WLDT69B
1. Identify and understand the API and AWS codes specifications;
 2. Interpret blueprint concepts in practical welding applications;
 3. Apply and properly join, fit up and align pipe welding joints;
 4. Employ and manually cut pipe joints using plasma, oxy-fuel and gouging equipment in accordance with manufacturing standards;
 5. Demonstrate welding of pipe to code specification with proper techniques in non-rotated 5G and 6G position using SMAW, GMAW, FCAW and GTAW processes;
 6. Identify welding pipe discontinuities and defects;
 7. Explain destructive and non-destructive welding test evaluations;
 8. Report on welder performance tests in 5G and 6G positions using one of the four welding processes mentioned above.

IV. MEASURABLE OBJECTIVES:

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

- A. Display skills required to pass a welding certification test;
 1. American Welding Society D1.1;
 2. American society of Mechanical Engineers Section IX;
 3. American Petroleum Institute 1104;

- B. List the requirements to take the specified certification test;
- C. Construct coupons required to pass the tests;
- D. Employ understanding of destructive and non-destructive examination of test welds;
- E. Identify discontinuities that will lead to test failure.

V. CONTENT:

- A. Read and discuss appropriate sections of the code books with respect to testing
- B. Requirements to pass a certification test to code requirements
- C. Preparation of test samples and coupons
- D. Hands-on practice under simulated test conditions/position
- E. Destructive and non-destructive examination of sample test
- F. Identification and discussion of discontinuities and results

VI. METHODS OF INSTRUCTION:

- A. **Simulations** -
- B. One-on-one, hands-on instruction
- C. **Audio-visual Activity** -
- D. **Observation and Demonstration** -

VII. TYPICAL ASSIGNMENTS:

- A. Welding samples using different welding processes
 - 1. Gas Tungsten Arc Welding (GTAW)
 - 2. Gas Metal Arc Welding (GMAW)
 - 3. Shielded Metal Arc Welding (SMAW)
 - 4. Flux-Core Arc Welding (FCAW)
- 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. Flat
 - 2. Horizontal
 - 3. Vertical
 - 4. Overhead
- D. Welding samples using different materials
 - 1. Carbon Steel
 - 2. Stainless Steel
 - 3. Aluminum
- E. Coupon preparation using semi-automated oxy-acetylene cutting torch
- F. Coupon preparation using hand-held grinder/sander

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. American Welding Society (2015). *Welding Inspection Technology* (2015 ed.). Miami, FL: American Welding Society.
- 5. Hoffman, D., Dahle, K., & Fisher, D. (2017). *Welding* (2 ed.). London, UK: Pearson.
- 6. Welding code books
- 7. American Welding society D1.1
- 8. American Society of Mechanical Engineers Section IX
- 9. American Petroleum Institute 1104

X. OTHER MATERIALS REQUIRED OF STUDENTS:

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