

Course Outline for WLDT 61A
BEGINNING SMAW AND FCAW THEORY

Effective: Spring 2018

I. CATALOG DESCRIPTION:

WLDT 61A — BEGINNING SMAW AND FCAW THEORY — 1.00 units

Theory and safety of Shielded Metal Arc (SMAW) and Flux-Core Arc (FCAW) welding of steel, flame cutting, plasma and carbon arc cutting. American Welding Society nomenclature, electrode and wire selection, job opportunities. Blueprint reading, welding symbols for welders and hazardous material regulation.

1.00 Units Lecture

Corequisite

WLDT 61AL - Beginning SMAW and FCAW Skills Lab
 or

WLDT 61BL - Advanced SMAW and FCAW Skills Lab

Grading Methods:

Letter or P/NP

Discipline:

- Welding

	MIN
Lecture Hours:	18.00
Total Hours:	18.00

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

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

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

- A. Explain and apply the theory and safe use of Shielded Metal Arc Welding (SMAW);
- B. Explain and apply the theory and safe use of Flux-Core Arc Welding (FCAW);
- C. Explain and apply the theory and safe use of Oxy-Fuel Cutting;
- D. Explain and apply the theory and safe use of Plasma Arc Cutting;
- E. Explain and apply the theory and safe use of Carbon Arc Cutting;
- F. Outline basic metallurgy and numbering systems for steels;
- G. Describe the AWS electrode numbering systems and uses for SMAW;
- H. Describe the AWS electrode wire numbering systems and uses for FCAW;
 - 1. Apply basic orthographic and isometric blueprint reading skills;
- J. Use and understand American Welding Society (AWS) welding symbols and nomenclature;
- K. Identify material hazards in the welding trade;
- L. Report on career opportunities in the welding trade.

V. CONTENT:

- A. SMAW and FCAW theory and process basics
 - 1. Technique
 - 2. Power supplies, AC and DC, Constant Current
 - 3. Equipment and supplies
 - 4. Electrodes
 - 5. Uses and limitations
 - 6. Safety
 - 7. Industrial applications
 - 8. Industry trends
- B. FCAW theory, safety and process basics
 - 1. Technique
 - 2. Power supplies, AC and DC, Constant Voltage
 - 3. Equipment and supplies
 - 4. Electrodes
 - 5. Uses and limitations

- 6. Industrial applications
- 7. Safety
- 8. Industrial applications
- 9. Industry trends
- C. Oxy-Fuel cutting theory, safety and process basics
 - 1. Technique
 - 2. Equipment and supplies
 - 3. Filler metal
 - 4. Uses and limitations
 - 5. Safety
 - 6. Industrial applications
 - 7. Industry trends
- D. Plasma arc cutting theory, safety and process basics
 - 1. Technique
 - 2. Power supplies
 - 3. Equipment and supplies
 - 4. Uses and limitations
 - 5. Safety
 - 6. Industrial applications
 - 7. Industry trends
- E. Carbon arc cutting theory, safety and process basics
 - 1. Technique
 - 2. Power supplies
 - 3. Equipment and supplies
 - 4. Electrodes
 - 5. uses and limitations
 - 6. Safety
 - 7. Industrial applications
 - 8. Industry trends
- F. Understand basic metallurgy and numbering systems for steels
 - 1. Basic steel metallurgy
 - 2. Welding effects on metallurgy
 - 3. Heat Affected Zone (HAZ)
 - 4. AISI/SAE numbering system
 - 5. ASTM numbering system
 - 6. UNS numbering system
- G. Demonstrate knowledge of AWS electrode numbering systems and uses for SMAW
 - 1. AWS numbering system for SMAW electrodes
 - 2. Uses of different electrode classes
- H. Demonstrate knowledge of AWS electrode wire numbering systems and uses for FCAW
 - 1. AWS numbering system for FCAW electrode wires
- I. Apply basic orthographic and isometric blueprint reading skills
 - 1. Blueprint uses and applications
 - 2. Isometric drawings
 - 3. Orthographic drawings
 - 4. Assembly drawings
 - 5. Detail drawings
 - 6. Line types
 - 7. Dimensions
 - 8. Views
 - 9. Sections
 - 10. Notes
 - 11. Title block
 - 12. Bill of materials
- J. Use and understand American Welding Society (AWS) welding symbols and nomenclature
 - 1. AWS standard weld symbols
 - 2. AWS nomenclature
 - 3. Uses and applications
- K. Understand material hazards in the welding trade
 - 1. Material hazards
 - 2. Welding hazards
 - 3. MSDS
 - 4. OSHA
 - 5. Other safety
- L. Career opportunities in the welding trade
 - 1. Typical work
 - 2. Work environment
 - 3. Basic skills
 - 4. Apprenticeship
 - 5. Wages
 - 6. Advancement
 - 7. Outlook

VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Discussion** -
- C. Video content of welding processes
- D. Correlation with real world industrial applications
- E. Visual aids

VII. TYPICAL ASSIGNMENTS:

- A. Weekly reading assignments from text
- B. Quizzes based on weekly reading assignments

VIII. EVALUATION:

- A. **Methods**
 - 1. Exams/Tests
 - 2. Quizzes

3. Class Participation
4. Class Work
5. Home Work

B. Frequency

1. The midterm will be administered near the halfway point in the course followed by a two hour final exam during finals week
2. Quizzes will be administered periodically during the semester on an as needed basis
3. Participation will be evaluated daily
4. Classwork evaluated as assigned
5. Homework evaluated as assigned

IX. TYPICAL TEXTS:

1. American Welding Society D1.1 Technical Committee (2015). *Structural Steel Welding Code D1.1* (2015 ed.). Miami, FL: American Welding Society.
2. Walker, J.R., & Polanin, W.R. (2016). *Shielded Metal Arc Welding* (10th ed.). Tinley Park, IL: Goodheart Wilcox.
3. American Welding Society (2010). *Standard Welding Terms and Definitions* (2010 ed.). Miami, FL: American Welding Society.
4. Bowditch, W.A., Bowditch, M.A., & Bowditch, K.E. (2017). *Welding Fundamentals* (5th ed.). Tinley Park, IL: Goodheart Wilcox.

X. OTHER MATERIALS REQUIRED OF STUDENTS: