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Course Outline for WLDT 62A

BEGINNING GTAW AND GMAW THEORY

Effective: Spring 2018

I. CATALOG DESCRIPTION:
WLDT 62A — BEGINNING GTAW AND GMAW THEORY — 1.00 units

Theory of fuel and inert gas welding of steel, stainless steel and aluminum alloys, Oxy-Fuel welding, Oxy fuel brazing, flame cutting, and plasma cutting. Gas Tungsten Arc (GTAW) and Gas Metal Arc (GMAW) welding equipment and supplies. Nomenclature and metallurgy of steel, stainless steel and aluminum alloys. Introduction to blueprint reading and welding symbols. Hazardous material regulations and safety data sheets.

1.00 Units Lecture

Corequisite
WLDT 62AL - Beginning GTAW and GMAW Skills Lab
or

WLDT 62BL - Advanced GTAW and GMAW 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 Gas Tungsten Arc Welding (GTAW)
B. Explain and apply the theory and safe use of Gas Metal Arc Welding (GMAW)
C. Explain and apply the theory and safe use of Oxy-Fuel welding, brazing and cutting;
D. Explain and apply the theory and safe use of Plasma Arc Cutting;
E. Outline basic metallurgy and numbering systems for steels, stainless steel and aluminum;
F. Specify the AWS electrode numbering systems and uses for GTAW;
G. Specify the AWS electrode wire numbering systems and uses for GMAW;
H. Apply basic orthographic and isometric blueprint reading skills;
I. Use correctly Welding Society (AWS) welding symbols and nomenclature;
J. Identify material hazards in the welding trade;
K. Report on career opportunities in the welding trade.

V. CONTENT:
A. GTAW theory, safety and process basics
1. Technique
2. Power supplies, AC a dn DC, Constant Current
3. Equipment and supplies
4. Electrodes
5. Uses and limitations
6. Safety
7. Industrial applications
8. Industry trends
B. GMAW 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. Safety
7. Industrial applications
8. Industry trends

C. Oxy-Fuel cutting, welding, brazing 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 and aluminum
1. Basic steel metallurgy
2. Basic aluminum metallurgy
3. Welding effects on metallurgy
4. Heat Affected Zone (HAZ)
5. AISI/SAE numbering system
6. Aluminum Association numbering system
7. ASTM numbering system
8. UNS numbering system

G. Demonstrate knowledge of AWS electrode identification systems and uses for GTAW
1. AWS identification system for tungsten electrodes
2. Uses of different electrode classes

H. Demonstrate knowledge of AWS electrode identification systems and uses for GTAW
1. WS numbering system for GMAW 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. Correlation with real world industrial applications
C. Visual aids
D. **Discussion** -

VII. TYPICAL ASSIGNMENTS:

A. Weekly reading assignments from text
B. Quizzes based on weekly reading assignments
C. Tests include entire body of knowledge in course

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. Althouse, A., Turnquist, C., Bowditch, W., Bowditch, K., & Bowditch, M. (2012). *Modern Welding* (11th ed.). Tinley Park , IL: Goodheart-Willcox Company.
2. The Lincoln Electric Co (2013). *The Procedure Handbook for ARC Welding* (14th ed.). Cleveland, OH: The Lincoln Electric Co.
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 Wilcox.
5. Brown, W.C., & Brown, R.K. (2016). *Print Reading for Industry* (10th ed.). Tinley Park, Il: Goodheart Wilcox.

X. OTHER MATERIALS REQUIRED OF STUDENTS: