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Date Prepared: Spring 2017
C&GE approved: April 17, 2017
Board approved: May 10, 2017
Semester effective: Spring 2018

Welding (WELD) 1530 Gas Tungsten Arc Welding (GTAW) (3 Units) CSU

Prerequisite: Successful completion of WELD 1500 Welding Processes with a grade of “C” or better.

Prerequisite knowledge and skills:

Before entering the course, the student should be able to:

1. understand the principles of safe work habits in a shop setting as related to oxy-fuel cutting and the various electric arc welding processes,
2. set up oxy-fuel cutting equipment for the cutting of ferrous and nonferrous alloys, and
3. apply basic understanding of the common welding processes while utilizing proper safety and technique (SMAW, GMAW, FCAW and GTAW).

Total Hours: 32 hours lecture; 59 hours lab (91 total hours)

Course Description: This course will cover the theory and application of the Gas Tungsten Arc Welding (GTAW) process. Emphasis will be placed upon safe and proper application of GTAW and the practical use of welding principles on mild steel, aluminum, and stainless steel. Welding will be demonstrated on a variety of joints and base materials. Additional welding supplies may be required. This course has a material fee.

Type of Class/Course: Degree Credit

Text: Moniz, B.J., and R.T. Miller. *Welding Skills*. 5th ed. Orland Park, Illinois: American Technical Publishers, 2015.

Additional Instructional Materials:

Students are expected to have the following items:

1. #5 Shaded Safety Glasses & Clear Safety Glasses
2. Welding leather gloves
3. Work boots (above the ankle)
4. Long sleeve shirt & jeans (no holes or rips)
5. Welding hood/helmet
6. Welding cap
7. Pair of pliers (multi-use, wire cutters)
8. Wire brush
9. Chipping hammer

Optional material/equipment:

1. Grinder

Course Objectives:

By the end of the course, a successful student will be able to:

1. understand and practice safe work habits in and around a fabrication shop,
2. understand and practice safe work habits related to Gas Tungsten Arc Welding (GTAW) ,
3. demonstrate the setup, operation, and theory related to Gas Tungsten Arc Welding (GTAW),
4. demonstrate the use of Gas Tungsten Arc Welding (GTAW),
5. apply skills and knowledge required to successfully create a proper weldment in a variety of positions while using common welding electrodes, and
6. understand the various welding tests often associated with the Gas Tungsten Arc Welding (GTAW) process.

Course Scope and Content: Lecture

Unit I Introduction and Safety Procedures

- A. Overview
- B. Safety related to Gas Tungsten Arc Welding (GTAW)
- C. Safety related to gas cylinders and pressure reducing regulators

Unit II Gas Tungsten Arc Welding (GTAW)

- A. Equipment
- B. Setup and operation

Unit III Weld Joints

- A. Butt
- B. Lap
- C. Tee
- D. Edge
- E. Corner

Unit IV Welding Positions and Sequencing 1G Flat (joints, plate)

- A. 2G Horizontal (joints, plate)
- B. 3G Vertical (joints, plate)
- C. 4G Overhead (joints, plate)

Unit V Electrode Selection and Consumables

- A. Tungsten identification
- B. Filler metals
- C. Parts and consumables related to Gas Tungsten Arc Welding (GTAW)
- D. Composition and requirements

Unit VI Metals

- A. Welding of carbon steel
- B. Welding of stainless steel
- C. Welding of aluminum
- D. Metal properties and identification 45 degree(practice until told to move on)
- E. Polarity

- Unit VII Gas Cylinders and Pressure Reducing Regulators
- A. Identification of gases
 - B. Transportation
 - C. Parameters
 - D. Proper assembly/disassembly

- Unit VIII Welding Standards
- A. Codes
 - B. Standards and costs

- Unit IX Weld Quality
- A. Inspection of welds
 - B. Defects and defects and discontinuities

- Unit X Welding Careers and Future Training
- A. Future training opportunities
 - B. Possible career options and types

Course Scope and Content: Laboratory

- Unit I Gas Tungsten Arc Welding (GTAW) Safety
- A. Perform Job Safety Analysis (JSA)
 - B. Demonstrate safe operation of tools and equipment

- Unit II Gas Tungsten Arc Welding (GTAW)
- A. Perform adjustments and fine-tuning of equipment
 - B. Setup and operation

- Unit III Weld Joints
- A. Perform welds on different joints
 - B. Identify joint types

- Unit IV Welding Positions and Sequencing
- A. Perform welds in 1G flat position on joints and plate
 - B. Perform welds in 2G horizontal position on joints and plate
 - C. Perform welds in 3G vertical position on joints and plate
 - D. Perform welds in 4G overhead position on joints and plate

- Unit V Electrode Selection and Consumables
- A. Apply knowledge of electrodes to appropriate application
 - B. Identify and utilize parts and consumables

- Unit VI Metals
- A. Practice welding on carbon steel, stainless steel, and aluminum
 - B. Apply specific knowledge and technique to appropriate metals
 - C. Select appropriate polarity per metal being welded

- Unit VII Gas Cylinders and Pressure Reducing Regulators
- A. Apply knowledge of gases to appropriate application
 - B. Safe utilization and transportation
 - C. Safe and proper assembly/disassembly

- Unit VIII Weld Quality
- A. Identify and address defects and discontinuities
 - B. Perform visual inspection of welds

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside regular class time doing the following:

- 1. Assigned readings from the text
- 2. Completing the necessary assignments

Methods of Instruction:

- 1. Lecture and discussion
- 2. Group Activities/ Projects
- 3. Presentations
- 4. Guest lectures/ presentations
- 5. Laboratory activities
- 6. Class discussions

Methods of Evaluation:

- 1. Computational and non-computational problem-solving demonstrations
- 2. Skill demonstrations
- 3. Formative and summative examinations
- 4. Quizzes
- 5. Participation
- 6. Individual and group exercises and projects
- 7. Reports and written assignments
- 8. Oral Presentation

Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

- 1. Curriculum development for each lab.
- 2. Published schedule of individual laboratory activities.
- 3. Published laboratory activity objectives.
- 4. Published methods of evaluation.
- 5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

- 1. Instructor is physically present in lab when students are performing lab activities.
- 2. Instructor is responsible for active facilitation of laboratory learning.
- 3. Instructor is responsible for active delivery of curriculum.
- 4. Instructor is required for safety and mentoring of lab activities.
- 5. Instructor is responsible for presentation of significant evaluation.

Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practicals, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean-up of equipment and materials.

Supplemental Data:

TOP Code:	095650: Welding Technology
SAM Priority Code:	C: Clearly Occupational
Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	Yes
Eligible for Pass/No Pass:	NO
Taft College General Education:	NONE