

COURSE OUTLINE **Gas Tungsten Arc Welding I (GTAW I)**

Course Description

WE 128. Gas Tungsten Arc Welding I (GTAW I). 3 hours credit. Prerequisite: A score at a pre-determined level on a placement instrument. This course will enable the student to recognize and apply proper fundamentals of Gas Tungsten Arc Welding (GTAW). The student will accomplish the following: explain the GTAW process; demonstrate the safe and correct set up of the GTAW workstation; relate GTAW electrode and filler metal classifications with base metals and joint criteria; demonstrate proper electrode and filler metal selection and use based on metal types and thicknesses; build pads of weld beads with selected electrodes and filler material in the flat and horizontal position; perform basic GTAW welds on selected weld joints; and perform visual inspection of GTAW welds. Safety practices are emphasized.

Course Relevance

The principles learned in this course will allow the student to understand and apply proper fundamental skills and process analysis in preparation for a position in a career of welding.

Required Materials

Althouse, A. D. (2004). *Modern welding*. Tinley Park, IL: Goodheart-Willcox Company, Inc.

Learning Outcomes

The intention is for the student to be able to:

1. Demonstrate safety in the use of GTAW.
2. Demonstrate basic GTAW skills.
3. Explain the fundamental theories of GTAW.

Learning PACT Skills that will be developed and documented in this course

Through involvement in this course, the student will develop ability in the following PACT skill area(s):

Technology Skills

1. Discipline-specific technology
 - Through the use of current industry standards and technology the student will be able to perform specific welding functions with a high level of proficiency.

Major Summative Assessment Task(s)

These learning outcome(s) and the Learning PACT skill(s) will be demonstrated by:

1. Recognizing and using correct technique and equipment to perform specific weld profiles using the GTAW process.
2. Identifying problems and correcting them using industry accepted welding principles.

Course Content

- I. Skills or Competencies – Actions that are essential to achieve the course outcomes:
 - A. Explain the GTAW process
 - B. Demonstrate the safe and correct set up of the GTAW workstation
 - C. Relate GTAW electrode and filler metal classifications with base metals and joint criteria
 - D. Demonstrate proper electrode and filler metal selection and use based on metal types and thicknesses
 - E. Build pads of weld beads with selected electrodes and filler material in the flat position
 - F. Build pads of weld beads with selected electrodes and filler material in the horizontal position
 - G. Perform basic GTAW welds on selected weld joints
 - H. Perform visual inspection of GTAW welds
 - I. Perform a field strip and name all consumable parts of a GTAW gun
 - J. Demonstrate the ability to change out the shielding gas cylinder on a GTAW station
- II. Themes – Key recurring concepts that run throughout this course:
 - A. Safety
 - B. Quality
- III. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
 - A. The force of gravity in relation to molten metal and various welding positions
 - B. The impact of critical welding fundamentals in relation to proper weld profiles
- IV. Concepts – Key concepts that must be understood to address the issues:
 - A. Heat selection
 - B. Proper joint preparation
 - C. Process analysis
 - D. Terminology
 - E. The principles of electrode manipulation

Learning Units

- I. Safety in the welding shop
 - A. Accidents
 - B. General shop safety
 - C. Safety in the welding environment
 - D. Oxy-fuel Gas Welding and cutting safety
 - E. Arc Welding and cutting safety
 - F. Resistance welding safety
 - G. Safety around welding robots
 - H. Special welding process safety
- II. GTAW and GMAW equipment and supplies
 - A. The GTAW station
 - B. Arc Welding Power Sources for GTAW

- C. Balanced and unbalanced AC waves
- D. Shielding gases used with GTAW
- E. Electrode leads and hoses used for GTAW
- F. GTAW torches
- G. Tungsten electrodes
- H. Fillers metals used with GTAW
- I. The GMAW station
- J. Arc welding power sources of GMAW
- K. Wire feeders used with GMAW
- L. GMAW shielding gases
- M. The GMAW welding gun
- N. GMAW electrodes
- O. Smoke-extracting systems
- P. Flux Cored Arc Welding (FCAW)
- Q. The Flux Cored Arc Welding station
- R. Flux Cored Arc Welding electrode wire
- S. Accessory devices
- T. Filter lenses or use when gas-shielded arc welding
- U. Protective clothing

III. GTAW

- A. GTAW principles
- B. GTAW power sources
- C. Setting up the GTAW station
- D. Preparing metal for welding
- E. Methods of starting the arc
- F. GTAW techniques
- G. Shutting down the GTAW station
- H. Welding joints in the flat welding position
- I. Welding joints in the horizontal welding position
- J. Welding joints in the vertical welding position
- K. Welding joints in the overhead welding position
- L. Semiautomatic welding
- M. Automatic and mechanized GTAW
- N. GTAW troubleshooting guide

Learning Activities

Learning activities will include classroom lecture and hands-on exercises in both booth and shop.

Grade Determination

The student will be graded on completion of competency assessment tasks and learning activities.