

SAN DIEGO COMMUNITY COLLEGE DISTRICT  
CONTINUING EDUCATION  
COURSE OUTLINE

**SECTION I**

**SUBJECT AREA AND COURSE NUMBER**

INDT 621

**COURSE TITLE**

GAS TUNGSTEN ARC WELDING I

**TYPE COURSE**

NON FEE

VOCATIONAL

**CATALOG COURSE DESCRIPTION**

This is a course that is designed to provide basic instruction and applied techniques in the Gas Tungsten Arc Welding (GTAW) process on ferrous sheet, tube, and pipe. Topics to be covered include orientation, safety, measuring tools, material types, metal cutting and GTAW procedures and practices. Workplace skills including math, communications and business ethics are integrated into the curriculum. Students successfully completing this course will be prepared for entry-level and/or journeyman positions. (FT)

**LECTURE/LABORATORYHOURS**

300

**ADVISORIES**

Basic computer knowledge and internet search skills.

**RECOMMENDED SKILL LEVEL**

A sixth grade reading level, ability to communicate effectively in the English language and a working knowledge of basic math.

**INSTITUTIONAL STUDENT LEARNING OUTCOMES**

1. Social Responsibility  
SDCE students demonstrate interpersonal skills by leaning and working cooperatively in a diverse environment.
2. Effective Communication  
SDCE students demonstrate effective communication skills.

INSTITUTIONAL STUDENT LEARNING OUTCOMES (CONTINUED)

3. Critical Thinking  
SDCE students critically process information, make decisions, and solve problems independently or cooperatively.
4. Personal and Professional Development  
SDCE students pursue short term and life-long learning goals, mastering necessary skills and using resource management and self advocacy skills to cope with changing situations in their lives.

COURSE GOALS

1. To provide the student an introduction to the principles of ferrous materials and practices of the gas tungsten arc welding process.
2. To provide the student with instruction and practical experience necessary to safely perform gas tungsten arc welding projects utilizing a variety of materials types, sheet, shapes and tube stock.
3. The student will be introduced to gas tungsten arc welding techniques and practices to assist in welding a variety of materials types, sheet, shapes and tube stock projects and repairs.
4. In addition, the course will enhance the student's workplace skills including soft skills, math, communications, business ethics, etc., necessary to succeed in the welding and fabrication industry.

COURSE OBJECTIVES

1. Demonstrate the safety requirements and practices utilized in the ferrous gas tungsten arc welding process in the metal fabrication industry.
2. Utilize the terminology of today's gas tungsten arc welding process communicating with instructors, staff and students.
3. Set up, troubleshoot and safely operate gas tungsten arc welding equipment utilized in the welding industry.
4. Perform gas tungsten arc welding on a variety of materials utilizing sheet, shape and tube stock to American Welding Society acceptable standards.

**SECTION II**

COURSE CONTENT AND SCOPE

- |   |        |
|---|--------|
| 1. Orientation                          | 2 hrs  |
| 1.1. Course Syllabus                    |        |
| 1.2. Program overview                   |        |
| 1.3. Facilities orientation             |        |
| 2. Safety Orientation and Safety Topics | 30 hrs |
| 2.1. OSHA 10 simulation                 |        |
| 2.2. Right to Know                      |        |

COURSE CONTENT AND SCOPE (CONTINUED)

- 2.3. Material Safety Data Sheets (MSDS)
- 2.4. Shop safety
- 2.5. Hand tool safety
- 2.6. Power tool safety
  
- 3. Gas Tungsten Arc Welding Equipment 10 hrs
  - 3.1. Personal Protective Equipment (PPE)
  - 3.2. Power source classifications
  - 3.3. Shielded gas used with GTAW
    - 3.3.1. Shielded gas cylinders
    - 3.3.2. Shielded gas flowmeters and regulators
  - 3.4. Electrode leads and hoses
  - 3.5. Foot control
  - 3.6. GTAW torches
    - 3.6.1. Cooling units
    - 3.6.2. Torches
    - 3.6.3. Collets, collet bodies and gas lens
  - 3.7. Nozzles
    - GTAW Tungsten types
      - 3.7.1.1. Selection
      - 3.7.1.2. Sharpening and care
  - 3.8. Filler metals for GTAW
  - 3.9. Equipment assembly, adjustments and troubleshooting
  
- 4. Using Measuring Tools 3 hrs
  - 4.1. US Customary system
    - 4.1.1. Whole numbers
    - 4.1.2. Fractions
    - 4.1.3. Decimals
    - 4.1.4. Degrees
  - 4.2. Metric system
    - 4.2.1. Millimeter
  - 4.3. Math Functions
    - 4.3.1. Addition
    - 4.3.2. Subtraction
    - 4.3.3. Multiplication
    - 4.3.4. Division
  - 4.4. Measuring tape
  - 4.5. Compass
  - 4.6. Calipers
  - 4.7. Sheet Metal Gage
  - 4.8. Electronic measuring instruments

COURSE CONTENT AND SCOPE (CONTINUED)

5. Material Types and Characteristics	5 hrs
5.1. Material type	
5.1.1. Ferrous metals	
5.2. Classification of metals	
5.3. Sheet stock	
5.3.1. Thickness measurements	
5.3.2. Weight measurements	
5.4. Shapes	
5.4.1. Flat bar	
5.4.2. Round bar	
5.4.3. Square bar	
5.4.4. Hex bar	
5.4.5. Angle	
5.4.6. Tee	
5.4.7. Channel	
5.4.8. Z-bar	
5.5. Pipe, Tubing and Fittings	
5.5.1. Material types	
5.5.2. Classification of piping and tubing	
5.6. Measurement of sheet, piping and tubing	
6. Metal Cutting	10 hrs
6.1. Shearing	
6.1.1. Hand shear	
6.1.2. Power shear	
6.2. Hand plasma cutting	
6.2.1. Straight cutting	
6.2.2. Bevel cutting	
7. Metal Preparation	10 hrs
7.1. Hand finishing	
7.2. Power tool grinding	
7.3. Sand blasting	
8. Gas Tungsten Arc Welding Practices and Principals	230 hrs
8.1. GTAW practices and principals	
8.2. Welding wires	
8.2.1. Identification of wires	
8.2.2. Selection of wires	
8.3. Wire characteristics and manipulation	
8.3.1. Steel wires	
8.4. Sheet material all positions	
8.4.1. Ferrous materials	
8.4.1.1. Lap joints	
8.4.1.2. Fillet joints	

COURSE CONTENT AND SCOPE (CONTINUED)

- 8.4.1.3. Butt joints
- 8.5. Shapes and tubing all positions
  - 8.5.1. Ferrous materials
    - 8.5.1.1. Fillet joints
    - 8.5.1.2. Butt joints

APPROPRIATE READINGS

Students may be given reading assignments from the course text book, informational handouts, related trade magazines and internet articles.

WRITING ASSIGNMENTS

Typical writing assignments will include: completing assigned reports, providing written answers to assigned questions, performing arithmetic calculations as assigned and completing shop and/or job orders.

OUTSIDE ASSIGNMENTS

Students are expected to spend a minimum of one hour per day outside of the class in practice and preparation for each day in class. Appropriate assignments may include, but are not limited to: appropriate internet research, readings, preparing research reports, preparing appropriate writing assignments and studying as needed to perform successfully in class.

APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Students will perform analysis and evaluation of reading and/or classroom materials and utilize this analysis in classroom discussions, writing assignments, and in performing laboratory activities. Students must select and use appropriate methods and materials needed to complete laboratory assignments.

EVALUATION

A student's grade will be based on multiple measures of performance related to the course objectives. The assessment will measure development of independent critical thinking skills and will include evaluation of the student's ability. Multiple measures may include, but are not limited to the following: quizzes, lab projects, classroom participation, and attendance.

Upon successful completion of the course a Certificate of Course Completion will be issued.

Upon successful completion of this course and Gas Tungsten Arc Welding II a Certificate of Program Completion will be issued.

### METHOD OF INSTRUCTION

Methods of instruction will include, but are not limited to, lectures, demonstrations, laboratory, audio-visual presentations and computer assisted instruction. Group and individual instructions, field trips, guest speakers, job shadowing and internships/externships may also be utilized.

This course, or sections of this course, may be offered through distance education.

### TEXT AND SUPPLIES

*Welding Principles and Practices*, Raymond J. Sacks, Current Edition, McGraw Hill  
*AWS D1.2/D1.2M:2008*, Structural Welding Code - Aluminum, American Welding Society  
*AWS D1.3/D1.3M:2008*, Structural Welding Code - Sheet Steel, American Welding Society  
*AWS D1.6:1999*, Structural Welding Code - Stainless Steel

#### Periodicals:

The Fabricator  
The Welding Journal  
Practical Welding Today

#### Web Sites:

American Welding Society (AWS), (<http://www.aws.org>)  
American Society for Testing and Materials (ASTM), (<http://www.astm.org>)  
American Society of Mechanical Engineers (AMSE), (<http://www.asme.org>)

#### Supplies:

A course syllabus and relevant handouts will be supplied by the Instructor  
The student will need to provide his/her pen/pencil, notebook, paper and the following equipment:

Safety glasses  
Welding hood, full face  
Welding jacket, leather  
Welders cap  
Gloves, welding, light duty, leather  
Gloves, metal handling, leather  
Filter plates, glass, shade #10 & #11  
Cover plates, plastic  
Stainless wire brush, small  
Tape measure, 25 foot, one inch wide  
Vise grips, 10 inch  
Soapstone holder, rectangular, with soapstone

PREPARED BY: William Borinski

DATE April 30, 2012

REVISED BY Bob Pyle

DATE May 6, 2020

Instructors must meet all requirements stated in Policy 3100 (Student Rights, Responsibilities and Administration Due Process) and the attendance Policy set forth in the Continuing Education Catalog

References

San Diego Community College District Policy 3100  
California Community College, Title 5, Section 55002  
Continuing Education Catalog