SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

INDT 601

COURSE TITLE

Shielded Metal Arc Welding 1

TYPE-COURSE

NON-FEE VOCATIONAL

CATALOG COURSE DESCRIPTION

This course provides basic instruction in shielded metal arc welding (SMAW) in a classroom and hands-on laboratory. Topics include shop safety; shop math; print reading; soft skills; and SMAW fundamentals, principles, materials, techniques, and practices. Laboratory equipment to be provided by the student; student may apply for (requires approval) loaner equipment. Students successfully completing this course will be prepared for Shielded Metal Arc Welding 2. (FT)

LECTURE/LABORATORY HOURS

300

ADVISORIES

None

RECOMMENDED SKILL LEVEL

1. Reading comprehension and writing skills at an eighth grade level
2. Working knowledge of basic math
3. Ability to communicate effectively in the English language
4. Basic computer knowledge and internet search skills

A high school diploma or equivalent is highly recommended for successful completion of this course and future employment.

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility: SDCCE students demonstrate interpersonal skills by learning and working cooperatively in a diverse environment.
2. Effective Communication: SDCCE students demonstrate effective communication skills.
3. Critical Thinking: SDCCE students critically process information, make decisions, and solve problems independently or cooperatively.
4. Personal and Professional Development: SDCCE 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.
5. Diversity, Equity, Inclusion, Anti-Racism, and Access: SDCCE students critically and ethically engage with local and global issues using principles of equity, civility, and compassion as they apply their knowledge and skills: exhibiting awareness, appreciation, respect, and advocacy for diverse individuals, groups, and cultures.

COURSE GOALS

1. Introduce the fundamentals, principles, techniques, and practices of SMAW.
2. Enhance workplace shop skills and soft skills necessary to succeed in the welding industry.
3. Provide instruction and practical experience necessary to safely perform SMAW.
4. Prepare for a practical weld test using SMAW.

COURSE OBJECTIVES

Upon successful completion of the course the student will be able to:

1. Demonstrate knowledge of SMAW fundamentals and principles and use correct terminology when communicating with instructors, staff, and other students.
2. Demonstrate knowledge and application of shop safety, shop math, print reading, critical thinking, and soft skills.
3. Set up, perform basic troubleshooting, and safely operate various cutting equipment, welding equipment, and ancillary power tools and hand tools to produce weldments using SMAW.
4. Pass a practical weld test on a T-joint fillet on steel plate using SMAW in conformance with American Welding Society visual inspection standards.

SECTION II

COURSE CONTENT AND SCOPE

1. Orientation
   - 1.1. Course syllabus
   - 1.2. Course overview
   - 1.3. Facilities orientation
   - 1.4. Workplace soft skills
2. Safety Orientation and Training
   - 2.1. OSHA Hazard Communication Standard (right-to-know and safety data sheets)
   - 2.2. Welding shop safety
   - 2.3. Personal protective equipment (PPE)

- 2.4. First aid in a welding environment
- 2.5. Welding machine and cutting equipment safety
- 2.6 Power tool and hand tool safety

3. Shop Math
   - 3.1. Introduction to whole numbers
   - 3.2. Basic math functions using whole numbers
4. Print Reading
   - 4.1. Language of the industry
   - 4.2. Measurement basics
   - 4.3. Alphabet of lines
5. Ferrous Material Properties, Handling, Preparation, and Finishing
   - 5.1. Material types, classifications, measurements, and shapes
   - 5.2. Safe material cutting guidelines, techniques, and practices
   - 5.3. Manual and mechanized cutting with oxy-fuel equipment
   - 5.4. Manual and mechanized cutting with plasma arc equipment
   - 5.5. Other cutting processes as applicable
   - 5.6. Power tool grinding
   - 5.7. Weld cleaning
6. SMAW Fundamentals, Principles, Equipment, and Techniques
   - 6.1. Welding machine types, power sources, and output slopes
   - 6.2. Cables and connectors
   - 6.3. Electrodes and electrode holders
   - 6.4. Equipment setup, adjustment, and basic troubleshooting
   - 6.5. Welding positions and techniques
   - 6.6. Basic joint designs
   - 6.7. Weld discontinuities, defects, inspection, and testing
   - 6.8. Selected welding principles and applications as appropriate
7. SMAW Laboratory Practice
   - 7.1. Safe SMAW equipment operation guidelines, techniques, and practices
   - 7.2. SMAW equipment characteristics and settings
   - 7.3. SMAW electrode characteristics and manipulation
   - 7.4. SMAW weld practice
     - 7.4.1. Pad of beads on 3/8” steel plate using 1/8” E6010 electrode
     - 7.4.2. T-joint fit-up and multi-pass fillet weld on 3/8” steel plate using 1/8” E6010 electrode in 2F, 3F, and 4F positions
     - 7.4.3. Pad of beads on 3/8” steel plate using 1/8” E7018 electrode
     - 7.4.4. T-joint fit-up and multi-pass fillet weld on 3/8” steel plate using 1/8” E7018 electrode in 2F, 3F, and 4F positions
   - 7.5. SMAW weld test
     - 7.5.1. T-joint fit-up and single-pass fillet weld on 3/8” steel plate using 1/8” E7018 electrode in 3F and 4F positions
     - 7.5.2. Visual inspection to *American Welding Society D1.1/D1.1M Structural Welding Code – Steel* (current edition) standards

READING ASSIGNMENTS

Reading assignments may include, but are not limited to:

1. Course texts
2. Informational handouts
3. Articles from trade magazines and publications
4. Internet articles related to the welding industry and employment

Example of a reading assignment may include: Read the Modern Welding chapter on SMAW equipment and supplies

WRITING ASSIGNMENTS

Writing assignments may include, but are not limited to:

1. Maintaining a course notebook
2. Providing answers to assigned questions
3. Performing calculations for assigned math problems
4. Completing assigned reports

Example of a writing assignment may include: Answer the review questions for the Modern Welding chapter on SMAW equipment and supplies

OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to:

1. Studying as needed to complete assigned homework and exams and to prepare for classroom and laboratory activities
2. Watching assigned videos and providing written commentary, evaluation, and feedback
3. Conducting research and preparing reports and/or special projects
4. Attending and reporting on guest speaker events, welding shop field trips, and other industry related activities

Example of an outside assignment may include: Find and read a trade magazine or internet article that describes a current industry application of SMAW fillet welds and write a report to share with the class

ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Assignments that demonstrate critical thinking may include, but are not limited to:

1. Analyzing and evaluating reading assignments, videos, and sample welds for class discussions, writing assignments, and laboratory activities
2. Performing math calculations derived from word problems, print reading, and laboratory activities
3. Performing setup, adjustment, and basic troubleshooting of cutting equipment, welding equipment, and ancillary shop equipment

4. Selecting and using appropriate equipment, materials, procedures, and techniques on laboratory assignments
5. Performing visual inspection and measurement of laboratory welds using American Welding Society standards

Example of an assignment that demonstrates critical thinking may include: Create a 3-view orthographic drawing of a SMAW fillet weld project with dimensions and welding symbols

EVALUATION

A student's grade will be determined by multiple measures of performance evaluation based on the course goals and objectives and may include, but are not limited to:

1. Attendance and punctuality
2. Knowledge of shop safety and adherence to safety policies and procedures
3. Knowledge and application of welding fundamentals, principles, techniques, and practices
4. Accuracy and proficiency in setting up and using appropriate cutting equipment, welding equipment, and ancillary power tools and hand tools
5. Production of weldments that meet American Welding Society visual inspection standards
6. Competency in shop math and print reading, and practical application of both to assignments and activities
7. Participation and contribution to class and group discussions and activities
8. Demonstration of workplace soft skills and critical thinking

Methods of evaluation may include, but are not limited to:

1. Degree of attendance, participation, and contribution
2. Level of demonstrated soft skills and competencies
3. Graded assignments, quizzes, exams, and projects
4. Quantitative assessment of technical skills and competencies

Student progress is reported using the following recommended standard grading scale based on the percentage of total points earned compared to total points possible:

A = 90% to 100%
B = 80% to 89%
C = 70% to 79%
D = 60% to 69%
F = 0% to 59%

Upon successful completion of this course (a grade of C or better in both coursework and laboratory portions), a Certificate of Course Completion will be issued.

Upon successful completion of this course and Shielded Metal Arc Welding 2 (INDT 602), a Certificate of Program Completion will be issued.

METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

1. Interactive lectures
2. Audio-visual presentations
3. Class discussions
4. Individual study
5. Demonstrations
6. Group and individual instruction
7. Laboratory practice
8. Computer-assisted instruction
9. Collaborative and team activities
10. Special projects
11. Guest speakers
12. Field trips
13. Job shadowing

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

TEXTS AND SUPPLIES

Texts may include, but are not limited to:

1. *Modern Welding*; Andrew D. Althouse, Carl H. Turnquist, William A. Bowditch, Kevin E. Bowditch, and Mark A. Bowditch; Goodheart-Willcox; current edition
2. *Modern Welding Lab Workbook*; William A. Bowditch, Kevin E. Bowditch, and Mark A. Bowditch; Goodheart-Willcox; current edition
3. *Math for Welders*, Nino Marion, Goodheart-Willcox, current edition
4. *Welding Print Reading*, John R. Walker and W. Richard Polanin, Goodheart-Willcox, current edition

Texts may be offered in eBook format for use in distance education.

Supplies may include, but are not limited to:

1. Course materials provided by the instructor:
   a. Course syllabus
   b. Relevant handouts
2. Class materials provided by the student:
   a. Pen/pencil, notebook, and paper
   b. Smartphone and computer with camera and reliable internet access
3. Laboratory equipment provided by the student:
   a. Safety glasses
   b. Burning goggles (optional)
   c. Welding hood, full face
   d. Welding cap
   e. Filter plates, glass, shades #10 and #11 (for passive welding hoods only)

f. Cover plates, plastic
g. Welding jacket, leather
h. Gloves, welding, heavy duty, leather
i. Gloves, metal handling, leather (optional)
j. Boots, leather
k. Torch lighter
l. Chipping hammer
m. Wire brush, large
n. Vise grip, 10 inch
o. Tape measure, 25 foot, one inch wide (optional)
p. Soapstone marker
q. Flashlight
r. Lock for laboratory locker

If the student is unable to provide the above laboratory equipment, they may apply for VTEA (Vocational and Technical Education Act) approval for loaner equipment.

PREPARED BY: William Borinski DATE: April 30, 2012

REVISED BY: Bob Pyle and Brad Dorschel DATE: December 10, 2022

Instructors must meet all requirements stated in Policy 5500 (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 5500
California Community College, Title 5, Section 55002
Continuing Education Catalog