

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

INDT 601

COURSE TITLE

SHIELDED METAL ARC WELDING I

TYPE COURSE

NON FEE

VOCATIONAL

CATALOG COURSE DESCRIPTION

This is an open entry/exit course providing basic instruction in the Shielded Metal Arc Welding (SMAW) process on steel plates and shapes. Topics to be covered include orientation, safety, measuring tools, material types, metal cutting and preparation and SMAW 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 positions. (FT)

LECTURE/LABORATORY HOURS

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 trade 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. Introduce the principles and practices of the shielded metal arc welding process used in the welding industry today.
2. Provide the student with instruction and practical experience necessary to safely perform shielded metal arc welding on projects utilizing a steel plates and shapes.
3. Introduce shielded metal arc welding techniques and practices to assist in welding a steel plate and shape projects and repairs utilizing fillet welds to American Welding Society acceptable standards.
4. Enhance the student's workplace skills including soft skills, math, communications, business ethics, etc., necessary to succeed in the welding industry.
5. Prepare for a simulated fillet weld test using the SMAW in the 3-F and 4-F positions in conformance with approved procedures in D1.1 American Welding Society (AWS) Structural Welding Code - Steel.

COURSE OBJECTIVES

1. Demonstrate knowledge and skills related to safety requirements and practices utilized in the shielded metal arc welding process in metal fabrication industry.
2. Utilize correct terminology of current shielded metal arc welding process when communicating with instructors, staff and fellow students.
3. Set up, troubleshoot and safely operate various shielded metal arc welding equipment found in welding industry today.
4. Demonstrate appropriate shielded metal arc welding techniques and practices to assist in welding a steel plate, shape projects, and make repairs utilizing fillet welds to the American Welding Society acceptable standards.
5. Demonstrate workplace skills including soft skills and skills in math, communications, business ethics, etc., necessary to succeed in the welding industry.

SECTION II

COURSE CONTENT AND SCOPE

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|-----------------------------|-------|
| 4. Program Orientation | 2 hrs |
| 4.1. Course Syllabus | |
| 4.2. Program overview | |
| 4.3. Facilities orientation | |

COURSE CONTENT AND SCOPE (CONTINUED)

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| 5. Safety Orientation and Safety Topics | 30 hrs |
| 5.1. OSHA 10 simulation | |
| 5.2. Right to Know | |
| 5.3. Material Safety Data Sheets (MSDS) | |
| 5.4. Shop safety | |
| 5.5. Hand tool safety | |
| 5.6. Power tool safety | |
| 6. Shielded Metal Arc Welding Equipment (SMAW) | 10 hrs |
| 6.1. Personal Protective Equipment (PPE) | |
| 6.2. Power source classifications | |
| 6.2.1. Alternating Current | |
| 6.2.2. Direct current | |
| 6.2.3. Transformers | |
| 6.2.4. Inverters | |
| 6.2.5. Engine driven | |
| 6.3. Welding leads and connectors | |
| 6.4. Electrode holders | |
| 6.5. Grounding | |
| 6.6. Electrodes for SMAW | |
| 6.6.1. Classification | |
| 6.6.2. Selection | |
| 6.6.3. Electrode care | |
| 6.7. Remote controls | |
| 6.8. Equipment assembly and adjustments | |
| 6.9. Trouble shooting techniques | |
| 7. Using Measuring Tools | 3 hrs |
| 7.1. US Customary system | |
| 7.1.1. Whole numbers | |
| 7.1.2. Fractions | |
| 7.1.3. Decimals | |
| 7.1.4. Degrees | |
| 7.2. Metric system | |
| 7.2.1. Millimeter | |
| 7.3. Math Functions | |
| 7.3.1. Addition | |
| 7.3.2. Subtraction | |
| 7.3.3. Multiplication | |
| 7.3.4. Division | |
| 7.4. Measuring tape | |
| 7.5. Compass | |
| 7.6. Simple caliper (in/mm) | |
| 7.7. Electronic measuring instruments | |

COURSE CONTENT AND SCOPE (CONTINUED)

8. Steel Material Types	5 hrs
8.1. Material types	
8.1.1. Carbon steel	
8.1.2. Mild steel	
8.2. Classification of metals	
8.2.1. AISI-SAE designation	
8.3. Steel plates	
8.3.1. Thickness measurements	
8.3.2. Weight measurements	
8.4. Steel shapes	
8.4.1. Flat bar	
8.4.2. Round bar	
8.4.3. Square bar	
8.4.4. Hex bar	
8.4.5. Angle	
8.4.6. Tee	
8.4.7. Channel	
8.4.8. I-beam	
8.4.9. H-beam	
8.4.10. Z-bar	
9. Steel Material Cutting	10 hrs
9.1. Hand cutting with oxy-fuel equipment	
9.1.1. Straight cutting	
9.1.2. Bevel cutting	
9.2. Machine cutting with oxy-fuel equipment	
9.2.1. Straight cutting	
9.2.2. Bevel cutting	
10. Steel Material Preparation	10 hrs
10.1. Power tool grinding	
10.2. Sand blasting	
11. Shielded Metal Arc Welding Practices on Steel Material	230 hrs
11.1. SMAW practices and principals	
11.2. Welding electrodes	
11.2.1. Identification of electrodes	
11.2.2. Selection of electrodes	
11.3. Electrode characteristics and manipulation	
11.3.1. E-60XX series	
11.3.2. E-70XX series	
11.4. Welding equipment	
11.4.1. Equipment types	
11.4.2. Equipment specifications	
11.4.3. Equipment selection	

COURSE CONTENT AND SCOPE (CONTINUED)

- 11.5. Steel plate projects in all positions (project will utilize material available)
 - 11.5.1. Fillet joints
- 11.6. Steel shapes projects in all positions (project will utilize material available)
 - 11.6.1. Fillet joints
- 11.7. Weld test practices and guidelines
 - 11.7.1. Fillet weld test on steel plate
 - 11.7.1.1. E-7018 electrode
 - 11.7.1.2. Steel plate (3/8 inch thickness)
 - 11.7.1.3. Test in 3F and 4F positions
 - 11.7.2. Test conformance to AWS D1.1/D1.1M:current edition, Structural Welding Code – Steel
 - 11.7.2.1. Visual Inspection to AWS Standards
 - 11.7.2.2. Certification option at outside agency

APPROPRIATE READINGS

Students may be given reading assignments from the course text books, 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, equipment 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.

EVALUATION (CONTINUED)

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

Upon successful completion of this course and Shielded Metal 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 D1.1/D1.1M, Structural Welding Code - Steel, Current Edition, American Welding Society

Periodicals:

The Fabricator Magazine

The Welding Journal

Practical Welding Today Magazine

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 and the following equipment:

1. Safety glasses
2. Welding hood, full face
3. Burning goggles
4. Welders cap
5. Gloves, welding, heavy duty, leather
6. Gloves, metal handling, leather
7. Filter plates, glass, shade #5, #10 & #11
8. Cover plates, plastic
9. Tip cleaners
10. Torch lighter
11. Wire brush, small
12. Tape measure, 25 foot, one inch wide
13. Vise grips, 10 inch
14. Soapstone holder, rectangular, with soapstone

SHIELDED METAL ARC WELDING I
PAGE 7

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