

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

INDT 602

COURSE TITLE

SHIELDED METAL ARC WELDING II

TYPE COURSE

NON FEE

VOCATIONAL

CATALOG COURSE DESCRIPTION

This is a course providing instruction in the Shielded Metal Arc Welding (SMAW) process on steel plate and shapes. Topics to be covered include orientation, safety, print reading, measuring tools, material preparation and SMAW and procedures. 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

Satisfactory completion of Shielded Metal Arc Welding I; 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. Introduce the principles and practices of the basic 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. Introduced to shielded metal arc welding techniques and practices to assist in welding a steel plate and shape projects and repairs.
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 the simulated groove weld test using the SMAW in the 3-G and 4-G 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 groove 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

1. Program Orientation 2 hrs
 - 1.1. Course Syllabus
 - 1.2. Program overview
 - 1.3. Facilities orientation

COURSE CONTENT AND SCOPE (CONTINUED)

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| 2. Safety Orientation and Safety Topics | 15 hrs |
| 2.1. OSHA 10 simulation | |
| 2.2. Right to Know | |
| 2.3. Material Safety Data Sheets (MSDS) | |
| 2.4. Shop safety | |
| 2.5. Hand tool safety | |
| 2.6. Power tool safety | |
| 3. Print Reading | 25 hrs |
| 3.1. Print concepts | |
| 3.2. Print layout | |
| 3.3. Print interpretation sequence | |
| 3.4. Basic lines | |
| 3.5. Projection methods | |
| 3.6. Views | |
| 3.7. Sections | |
| 3.8. Details | |
| 3.9. Notes | |
| 3.10. Material list | |
| 3.11. Weld symbols | |
| 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. Simple caliper (in/mm) | |
| 4.7. Electronic measuring instruments | |
| 5. Steel Material Cutting | 10 hrs |
| 5.1. Hand cutting with plasma equipment | |
| 5.1.1. Straight cutting | |
| 5.1.2. Bevel cutting | |
| 5.2. Machine cutting with plasma equipment | |
| 5.2.1. Straight cutting | |
| 5.2.2. Bevel cutting | |

COURSE CONTENT AND SCOPE (CONTINUED)

- 5.3. Machine cutting with vertical band saw

- 6. Steel Material Preparation 10 hrs
 - 6.1. Power tool grinding

- 7. Shielded Metal Arc Welding Practices on Steel Material 235 hrs
 - 7.1. SMAW practices and principals
 - 7.2. Welding electrodes
 - 7.2.1. Identification of electrodes
 - 7.2.2. Selection of electrodes
 - 7.3. Electrode characteristics and manipulation
 - 7.3.1. E-70XX series
 - 7.4. Steel plate projects in all positions
 - 7.4.1. Butt joints
 - 7.5. Weld test practices and guidelines
 - 7.5.1. Simulated groove weld test on steel plate
 - 7.5.1.1. E-7018 electrode
 - 7.5.1.2. Steel plate (1/2 inch thickness)
 - 7.5.1.3. Steel plate (1 inch thickness)
 - 7.5.1.4. Test in the 3G and 4G positions
 - 7.5.2. Test to AWS D1.1/D1.1M:current edition, Structural Welding Code – Steel
 - 7.5.2.1. Visual Inspection to AWS Standards
 - 7.5.2.2. Certification option at outside agency

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 Shielded Metal Arc Welding I 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
Welding Print Reading, by John R. Walker, Current Edition, Goodheart-Willcox
Blueprint Reading for Welders, by A. F. Bennett, Current Edition, Delmar
AWS D1.1/D1.1M, Structural Welding Code - Steel, Current Edition, American Welding Society

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>)

TEXT AND SUPPLIES (CONTINUED)

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

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