

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

INDT 631

COURSE TITLE

METAL FABRICATION I

TYPE COURSE

NON FEE

VOCATIONAL

CATALOG COURSE DESCRIPTION

This is an open-entry/exit course that is designed to teach skills required for entry-level employment in the metal fabrication trade. Students will learn how to interpret prints, use measuring tools, use shop equipment, layout, oxy-fuel and plasma cutting, and fitting metal using hydraulic, pneumatic and hand tools with precision. Students successfully completing this course will be prepared for entry-level positions in metal fabrication. (FT)

LECTURE/LABORATORY HOURS

300

ADVISORY

Satisfactory completion of Shielded Metal Arc Welding I; Gas Metal Arc Welding and Gas Tungsten 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. To provide the student an introduction to the principles and practices of the metal fabrication industry.
2. To provide the student with instruction and practical experience necessary to safely perform metal fabrication projects utilizing a variety of shop power tools, hand power tools and hand tools required for ferrous.
3. The student will be introduced to metal fabrication techniques and practices to assist in fabrication projects and repairs required for ferrous.
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 metal fabrication industry.

COURSE OBJECTIVES

1. Demonstrate the safety requirements and practices utilized in the metal fabrication industry.
2. Utilize the terminology of today's metal fabrication trades in communicating with instructors, staff and students.
3. Set up and safely operate shop equipment and related power tools utilized in a typical metal fabrication shop.
4. Fabricate or make industry acceptable repairs to simple and complex metal parts and components.

SECTION II

COURSE CONTENT AND SCOPE

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|---|--------|
| 1. Program Orientation | 2 hrs |
| 1.1. Course Syllabus | |
| 1.2. Facilities orientation | |
| 2. Safety Orientation and Safety topics | 15 hrs |
| 2.1. Right to Know | |
| 2.2. Material Safety Data Sheets (MSDS) | |
| 2.3. Shop Safety | |

COURSE CONTENT AND SCOPE (CONTINUED)

- 2.4. Hand tool safety
- 2.5. Power tool safety

- 3. Print Reading 15 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. 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. Electronic measuring instruments

- 5. Shop Equipment 15 hrs
 - 5.1. Orientation and Use
 - 5.2. Set-up and use various equipment
 - 5.2.1. Tractor cutter
 - 5.2.1.1. Oxy-fuel torch
 - 5.2.1.2. Plasma torch
 - 5.2.2. Power shear
 - 5.2.3. Iron worker
 - 5.2.4. Drill press
 - 5.2.5. Power pipe bender
 - 5.3. Break down and securing various equipment

COURSE CONTENT AND SCOPE (CONTINUED)

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| 6. Shop Hand Tool | 15 hrs |
| 6.1. Orientation and Use | |
| 6.2. Set-up and use hand tools | |
| 6.2.1. Layout tools | |
| 6.2.2. Hand tools | |
| 6.2.3. Power tools | |
| 6.2.4. Mechanic tools | |
| 6.2.5. Hydraulic tools | |
| 7. Material Types and Characteristics | 10 hrs |
| 7.1. Material types | |
| 7.1.1. Ferrous metals | |
| 7.2. Classification of metals | |
| 7.3. Plates and Sheets utilized in metal fabrication | |
| 7.3.1. Thickness measurements | |
| 7.3.2. Weight measurements | |
| 7.4. Structural Shapes utilized in metal fabrication | |
| 7.4.1. Flat bar | |
| 7.4.2. Round bar | |
| 7.4.3. Square bar | |
| 7.4.4. Hex bar | |
| 7.4.5. Angle | |
| 7.4.6. Tee | |
| 7.4.7. Channel | |
| 7.4.8. I-beam | |
| 7.4.9. H-beam | |
| 7.4.10. Z-bar | |
| 7.5. Pipe, Tubing and Fittings | |
| 7.5.1. Material types | |
| 7.5.2. Classification of piping and tubing | |
| 7.5.3. Measurement of piping and tubing | |
| 8. Ferrous Material Cutting | 15 hrs |
| 8.1. Hand oxy-fuel torch cutting | |
| 8.1.1. Straight cutting | |
| 8.1.2. Bevel cutting | |
| 8.2. Tractor oxy-fuel torch cutting | |
| 8.2.1. Straight cutting | |
| 8.2.2. Bevel cutting | |
| 8.3. Hand plasma cutting | |
| 8.3.1. Straight cutting | |
| 8.3.2. Bevel cutting | |

COURSE CONTENT AND SCOPE (CONTINUED)

9. Ferrous Material Preparation and Finishing	15 hrs
9.1. Hand finishing	
9.2. Power tool grinding	
9.3. Sand blasting	
10. Fabrication Fixtures and Aids for Ferrous Material	15 hrs
10.1. Dogs and Wedges	
10.2. Saddles	
10.3. Pad eyes	
10.4. Strong backs	
10.5. Turnbuckles and braces	
10.6. Port-a-power	
10.7. Come along (mechanics hoist)	
11. Square and Leveling Methods	25 hrs
11.1. Speed square	
11.2. Framing square	
11.3. Rigid level	
11.4. String plumb	
11.5. Water hose level	
11.6. Electronic Level	
11.7. Electronic Plumb Level and Square (PLS)	
12. Fabrication Skills for Ferrous Material	155 hrs
12.1. Shop traveler	
12.2. Material layout	
12.2.1. Linear measurements	
12.2.2. Angular measurements	
12.2.3. Circular measurements	
12.3. Material preparation	
12.4. Material cutting and shearing	
12.5. Material forming	
12.6. Material joining	
12.6.1. Clamping	
12.6.2. Tacking	
12.6.3. Adhesive	
12.7. Squaring of material	
12.8. Plumbing of material	
12.9. Material finishing	
12.10. Final inspection	

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 Metal Fabrication 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.

TEXT AND SUPPLIES

Structural Steel Fabrication Practices, John W. Shuster, Current Edition, McGraw-Hill
Code of Standard Practice for Steel Buildings and Bridges, American Institute of Steel Construction, Inc., Current Edition

Welding Principles and Practices, Raymond J. Sacks, Current Edition, McGraw Hill

Blueprint Reading for Welders, by A. F. Bennett, Current Edition, Delmar

AWS D1.7/D1.7M:2010, Guide for Strengthening and Repairing Existing Structures, American Welding Society

TEXT AND SUPPLIES (CONTINUED)

Periodicals:

The Fabricator

The Welding Journal

Practical Welding Today

Web Sites:

American Welding Society (AWS), (<http://www.aws.org>)

American Institute of Steel Construction (AISC), (<http://www.aisc.org>)

American Society for Testing and Materials (ASTM), (<http://www.astm.org>)

American Society of Mechanical Engineers (AMSE), (<http://www.asme.org>)

Fabricators & Manufacturers Association, International (FMA) (<http://www.fmanet.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:

Safety glasses

Welding hood, full face

Welding jacket, leather

Welders cap

Gloves, welding, heavy duty, leather

Gloves, metal handling, leather

Filter plates, glass, shade # 10

Cover plates, plastic

Chipping hammer

Wire brush

Goggles, with shade # 5 filter plate

Tip cleaners

Torch lighter spark

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 _____

DATE _____

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