SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

MECT 432

COURSE TITLE

AIR CONDITIONING/HEATING II

TYPE COURSE

NON-FEE VOCATIONAL

CATALOG COURSE DESCRIPTION

This is the second course in a two course program that provides entry-level training in heating and air conditioning occupations. Instruction in this course will cover the following areas: gas and electric heating; cooling fundamentals, components and installation; heat pumps, general service, EPA certification, troubleshooting and job search techniques. (FT)

LECTURE/ LABORATORY HOURS

48

ADVISORIES

Successful completion of Air Conditioning/Heating I is recommended.

RECOMMENDED SKILL LEVEL

Understanding and reading comprehension in English, ability to calculate basic math at the 9th grade level or higher.

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility
   SDCE students demonstrate interpersonal skills by learning 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

To provide instruction and practical application of occupational knowledge and skills in the Heating and Air Conditioning (HVAC) industry and to provide students with a working knowledge of the tools and equipment associated with the modern HVAC industry. Integrated throughout the course are career preparation standards, which include communication, interpersonal skills, problem solving, safety, technology, and other employment skills. Students who successfully complete the program will be qualified for entry-level positions in the HVAC industry. Jobs in the field include air conditioning installer and repair helper, refrigeration installer and furnace installer.

COURSE OBJECTIVES

Students will demonstrate through practical applications, written and oral communication skills, their ability to:

1. Demonstrate basic comprehension of heating fundamentals including gas heating, electric heating and components that make up heaters.
2. Describe basic heating and air conditioning design criteria and its' effects on system performance.
3. Demonstrate comprehensive knowledge of EPA regulations, guidelines and prepare to take the EPA certification exam.
4. Demonstrate basic comprehension of cooling fundamentals and components that make up cooling systems including compressors, condensers, metering devices and evaporators.
5. Evaluate and troubleshoot heating and air conditioning systems.
6. Complete a resume and job application.
7. Model job interview techniques.
8. Describe career opportunities in the field.
9. Demonstrate the need for continuing education and learning.

SECTION II

COURSE CONTENT AND SCOPE

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

COURSE CONTENT AND SCOPE (CONTINUED)

1. Cooling Fundamentals — 9 Hours
   - 1.1. Principles of Cooling
   - 1.2. Refrigerants
   - 1.3. Proper Safety Procedures with Refrigerants
   - 1.4. Refrigerant Recovery
   - 1.5. Refrigerant Cycle
2. Cooling Components — 9 Hours
   - 2.1. Compressors
   - 2.2. Condensers
   - 2.3. Evaporators
   - 2.4. Metering Devices
3. Cooling Installation — 9 Hours
   - 3.1. Package Units
   - 3.2. Split Systems
   - 3.3. Refrigerant Piping
   - 3.4. Cranes – Proper Safety and Signal Procedures
   - 3.5. Rigging – Safety and Techniques
4. Heat Pumps — 3 Hours
   - 4.1. Heat Pump Operation
   - 4.2. Types of Heat Pumps
5. General Service — 3 Hours
   - 5.1. Charging the System
   - 5.2. Overall Troubleshooting
6. EPA Certification Preparation — 12 Hours
   - 6.1. Exam Preparation
7. Job Search Instruction — 3 Hours
   - 7.1. Selecting a job
   - 7.2. Finding employment openings
   - 7.3. Preparing for job interviews
   - 7.4. Job interview techniques
   - 7.5. Career ladders: keeping and advancing on the job

APPROPRIATE READINGS

Reading assignments may include but, are not limited to, the following: Textbooks, trade publications, equipment schematics, wiring symbols and diagrams.

WRITING ASSIGNMENTS

Writing assignments are required and may include, but are not limited to, the following: personal resume with cover letter, preparation of work orders, invoices, work proposals and time sheets.

OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to, the following:
Students are expected to spend a minimum of two hours per day outside of class in practice and preparation for each day in class. Appropriate assignments may include, but not limited to:

1. Appropriate readings
2. Preparing research projects
3. Preparing appropriate writing assignments
4. Studying as needed to perform successfully in class

APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Critical thinking assignments are required and may include, but are not limited to, the following: mathematical problems applied to the industry, interpretation of wiring schematics, sequencing of job operations, applications of real world troubleshooting using class theory.

EVALUATION

A student's grade will be based on multiple measures of performance related to the course objectives. Multiple measures may include, but are not limited to, the following: mid-term and final exams, quizzes, class participation and attendance.

METHOD OF INSTRUCTION

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

Lecture, discussion, computer assisted instruction, laboratory, discussion seminar, lecture/lab combination, learning modules, audio-visual, collaborative learning, job shadowing, guest speakers from industry, technology demonstrations, field trips or field assignments.

TEXTS AND SUPPLIES

Textbooks may include, but are not limited to:

Electricity for Refrigeration, Heating and Air Conditioning, Russell E. Smith, 2nd edition, Breton Publishers, a division of Wadsworth, Inc, North Scituate, Massachusetts, current edition.

Troubleshooting and Servicing HVAC&R Electrical Systems, ESCO Institute, current edition.

AnswerMan Principles of Air Conditioning, ESCO Institute, current edition.

AnswerMan Electricity for HVAC&R – A Guide to Troubleshooting, ESCO Institute, current edition.

Doolin's Troubleshooters Bible, Doolco Inc., current edition.

MANUALS:

Air Conditioning, Mechanical Equipment Service Manual. Published by the National Steamfitters and Pipefitters Apprenticeship Committee, current edition.

Standard Service Techniques, Chapter 2, Electrical, Carrier Air Conditioning Company, Syracuse, NY

PERIODICALS:

WEBSITES: www.york.com/; www.yorkupg.com/homeowners/index.asp; www.ashrae.org*;* http://hpac.com/ ; www.energycodes.gov/comcheck/89_compliance_manual.stm*;* www.ahrexpo.com/ *;* www.carrier.com; www.bryant.com; www.lennox.com;

SOFTWARE:

SUPPLIES:

PREPARED BY: Nancy Helt DATE: 1/28/10

REVISED BY: Instructional Services, SLOs added DATE: March 10, 2017

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

REFERENCES:

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