

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER

MECT 400

COURSE TITLE

APPLIANCE/REFRIGERATION REPAIR

ALTERNATE TITLE(S):

APPLIANCE REPAIR

TYPE OF COURSE

NON-FEE

VOCATIONAL

CATALOG COURSE DESCRIPTION

This is an open entry/exit course in the entry level skills required for employment in the Appliance/Refrigeration Repair industry. Instruction in the theory of operation, diagnosis, and the repair of major household appliances and microwave ovens is included. (FT)

LECTURE HOURS

140

LABORATORY HOURS

325

ADVISORIES

NONE

RECOMMENDED SKILL LEVEL

Eighth grade reading level, knowledge of general mathematics, ability to communicate effectively in the English language.

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 in the operational theory and repair of major appliances and refrigeration systems. Students will develop the necessary problem solving techniques used to diagnose malfunctioning appliance and refrigeration systems. The instruction is designed to enhance the students' reading, writing, math, communication skills and knowledge of science facts that are used in the industry. Instruction in customer communication skills and ethical business practices is also included.

COURSE OBJECTIVES

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

1. Demonstrate general safety practices and procedures related to the Appliance/Refrigeration Repair industry.
2. Demonstrate use of the latest equipment to diagnose and repair all major appliances.
3. Identify and interpret electrical schematics.
4. Repair various brands of major household appliances.
5. Charge, recover, and dispose of refrigerant according to EPA standards.
6. Complete all repairs in an efficient and competent manner.
7. Demonstrate competence in making service calls and proper customer relations.
8. Explain how to start and operate a small business.
9. Demonstrate use of a personal computer and basic software in order to access, retrieve, and save files.

SECTION II

COURSE CONTENT AND SCOPE

All Modules of the course contain the following:

1. System Descriptions
2. Theory of Operation
3. Diagnostic and Repair Procedures
4. Component Functions
5. Related Terminology

COURSE CONTENT AND SCOPE (CONTINUED)

Math review for all modules may cover the following areas: addition, subtraction, multiplication, and division of whole numbers, fractions and decimals; the metric system; prefixes; linear measurements; graphs; ratios; reading dial-gauges; liquid measurement; weight and mass.

MODULE I 10 Hrs.
SAFETY

1. Program Orientation
2. Shop and Equipment Introduction
3. Safety Procedures
 - 3.1. Fire safety
 - 3.2. Evacuation plan
 - 3.3. EPA rules and regulations
 - 3.4. MSDS use and location
 - 3.5. Hazardous material handling & disposal
 - 3.6. Proper hand tool use

MODULE II 15 Hrs.
BASIC ELECTRICAL THEORY

1. Electron Theory
2. Electrical Circuits
3. Diagnostic Methods
4. Diagnostic Equipment
5. Schematics

MODULE III 125 Hrs.
WASHING MACHINES

1. Automatic Clothes Washers
 - 1.1. Water fill and pump out
 - 1.1.1. Water valves
 - 1.1.2. Water level control
 - 1.1.3. Lint filter (manual & automatic)
 - 1.1.4. Pumps
 - 1.1.5. Water level control (electro/mech)
 - 1.2. Electrical components
 - 1.2.1. Timers
 - 1.2.2. Motors
 - 1.2.3. Solenoids
 - 1.2.4. Switches
 - 1.2.5. Temperature controls
 - 1.3. Mechanical components
 - 1.3.1. Transmissions
 - 1.3.2. Components that control agitation and basket spin
 - 1.3.3. Cabinets & support systems

COURSE CONTENT AND SCOPE (CONTINUED)

1.3.4. Fill hoses, drain hoses & misc. items

1.4. Diagnostics/repairs (mechanical & electrical)

MODULE IV

CLOTHES DRYERS

115 Hrs.

1. Gas Dryers

1.1. Types of fuels

1.1.1. Natural and manufactured

1.2. Components

1.2.1. Gas burners

1.2.2. Motors

1.2.3. Timers

1.2.4. Switches

1.2.5. Temperature controls (fixed and variable)

1.2.6. Cabinets, drum, seals, consoles, blowers

1.3. Diagnosis/repair, mechanical & electrical

1.4. Safety issues

1.4.1. Proper venting

1.4.2. Fires

1.4.3. Explosions

2. Electric Dryers

2.1. Components

2.1.1. Motors

2.1.2. Timers

2.1.3. Switches

2.1.4. Temperature controls

2.1.5. Heating element

2.1.6. Cabinet, drum, seals, consoles, blowers

2.2. Diagnosis/repair

2.2.1. Electrical (120V & 240V)

2.2.2. Mechanical

2.3. Safety issues working with high voltages

MODULE V

DISHWASHERS

40 Hrs.

1. Automatic Dishwashers

1.1. System components electrical

1.1.1. Timers

1.1.2. Motors

1.1.3. Heaters

1.1.4. Switches

1.1.5. Solenoids, thermostats

1.2. Mechanical components

1.2.1. Soap and rinse conditioners dispensers (electro/mech)

1.2.2. Cabinets, dish racks, spinner arm, tower

1.2.3. Pumps (belt and direct motor driven)

COURSE CONTENT AND SCOPE (CONTINUED)

- 1.2.4. Door seals, pump seals, air gaps
- 1.3. Diagnosis/repairs mech. & elect.
 - 1.3.1. Use and care of equipment
 - 1.3.2. Use of schematics
 - 1.3.3. Service and repair
 - 1.3.4. Operational checks mechanical and computerized

MODULE VI

130 Hrs.

COOKING RANGES AND OVENS

- 1. Gas Range Components
 - 1.1. Regulators
 - 1.2. Burners (surface and oven)
 - 1.3. Thermostats
 - 1.4. Control valves
 - 1.5. Timers, clocks, lights, convenience outlets
 - 1.6. Standing pilot and electric igniters
 - 1.7. Seals, grates, door springs, oven glass
 - 1.8. Service and repairs
 - 1.8.1. Burner adjustments
 - 1.8.2. Oven control adjustments
 - 1.8.3. Regulator testing and adjustments
 - 1.8.4. Various types of surface and oven burners
- 2. Electric Ranges
 - 2.1. Cooking elements (surface, bake and broil)
 - 2.2. Thermostats electro/mech type and electronic type
 - 2.3. Timers
 - 2.4. Electrical circuits (120V/240V)
 - 2.5. Self cleaning ovens
 - 2.6. Service and repair
 - 2.6.1. Use and care
 - 2.6.2. Use of schematics
 - 2.6.3. Diagnostics, repairs, testing
 - 2.6.4. Safety issues
- 3. Microwave Ovens
 - 3.1. Theory of operation
 - 3.2. Electrical and electronic components
 - 3.2.1. Transformers
 - 3.2.2. Magnetrons
 - 3.2.3. Timers
 - 3.2.4. Diodes and triacs
 - 3.2.5. Capacitors and resistors
 - 3.2.6. Relays and switches
 - 3.2.7. Small electric motors

COURSE CONTENT AND SCOPE (CONTINUED)

- 3.3. Use and care of equipment
- 3.4. Diagnostics and repairs
- 3.5. Safety precautions
 - 3.5.1. Microwave energy
 - 3.5.2. High voltage components.

MODULE VII
BUSINESS PROCEDURES AND CUSTOMER RELATIONS

30 Hrs.

- 1. Business Conduct and Ethics
 - 1.1. Consumer affairs
- 2. Repair Orders and Job Scheduling
- 3. Phone Skills
- 4. Oral and Written Communications
- 5. Keyboarding Skills and Computer Literacy for Use in this Field
- 6. Starting Your Own Business
 - 6.1. Small business license
 - 6.2. Capital investment
 - 6.3. Insurance
 - 6.4. Marketing

APPROPRIATE READINGS

- 1. Manufacturers technical manuals and service manuals.
- 2. Various parts manuals.
- 3. Trade magazines.

WRITING ASSIGNMENTS

Typical writing assignments will include, but are not limited to, all of the following:

- 1. Resume writing.
- 2. Providing written answers to assigned questions.
- 3. Complete repair orders.

OUTSIDE ASSIGNMENTS

Students are expected to spend a minimum of 1 hour per day outside of class in practice and preparation for each day of class. Appropriate assignments may include, but are not limited to:

- 1. Appropriate readings.
- 2. Preparing appropriate writing assignments.
- 3. 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. The assessment will measure development of independent critical thinking skills and will include evaluation of the students ability to:

1. Perform the manipulative skills of the craft, as required, to industry standards.
2. Maintain attendance per current policy.
3. Participate in classroom activities.
4. Perform on written, oral, or practical exams.
5. Demonstrate initiative and dependability.

The student will receive an evaluation at the end of each module. A grade point average of 2.0 or a letter grade of C or better must be achieved for satisfactory completion.

Upon successful completion of each individual course a Certificate of Course Completion will be issued. Upon successful completion of all courses in the program a Certificate of Program Completion will be issued.

METHOD OF INSTRUCTION

Classroom lectures, demonstrations, laboratory, audio-visual presentations, and computer assisted instruction, group and individual instruction, field trips, job shadowing and internships may be utilized.

TEXT AND SUPPLIES

Text:

Modern Refrigeration and Air Conditioning, Althouse, Turnquist, current edition
Corporate Training Manuals, current editions

PREPARED BY: Ray Ramirez DATE: July, 1982
REVISED BY: Charles O. Reasons DATE: May, 1984
REVISED BY: Jim Womack DATE: August, 1984
REVISED BY: Charles O. Reasons DATE: January 21, 1995
REVISED BY: Sammuel Cummings DATE: February, 2007
REVISED BY: Instructional Services, SLOs added DATE: March 9, 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