

MERCER COUNTY COMMUNITY COLLEGE  
Business & STEM Division

Course Outline

HRA104

Domestic Refrigeration/Air  
Conditioning Systems

Course Number

Course Title

Credits-4

Class Hours-2

Laboratory-4

TEXT: Refrigeration &  
Air Conditioning  
Technology Whitman,  
Johnson, Tomczyk  
ISBN: 0-76680667-7

15Weeks  
Length of Semester

Catalog Description

Operation, installation and repair methods for refrigeration, freezers, window air conditioners, central air conditioners and heat pumps; including control systems.

Prerequisite: HRA 102

Corequisite: None

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Latest Review: Spring 2019

## Course Objectives:

This course is intended to provide the student with the general knowledge of the operation, installation, service and repair methods for domestic refrigerators, freezers, room air conditioners and dehumidifiers. Also the operation, application, installation, repair and service methods of residential central air conditioning and heat pump systems. Particular attention will be given to electrical controls and room thermostats.

## UNIT I (7 nights) DOMESTIC REFRIGERATORS AND FREEZERS

### SPECIFIC OBJECTIVES

The student will be able to:

1. Explain the basic principles of operation of refrigerators and freezers.
2. Describe the various components of refrigerators and freezers and their function within the system.
3. Identify different cabinet configurations and construction methods.
4. Install, initially adjust and clean domestic refrigeration units.
5. Utilize meters and test equipment to diagnose system electrical and mechanical malfunctions.
6. Describe the operation of electrical controls in refrigerators and freezers.
7. Troubleshoot and correct common malfunctions of electrical control circuits in domestic units.
8. Describe the various types of defrost systems and their operation.
9. Maintain, service and repair basic mechanical components of domestic units.

### INSTRUCTIONAL CONTENT AND METHOD

1. A review of basic components will be given and slides and overheads will be used during lecture hours.
2. Reading will be assigned and handouts will be used.
3. Laboratory equipment will be used for training and evaluation of students ability to use proper maintenance, diagnosis and repair procedures.

### EVALUATION

1. At least one written test will be administered covering this material.
2. At least one shop evaluation will be given.

## UNIT II (7 nights) ROOM AIR CONDITIONERS AND DEHUMIDIFIERS

### SPECIFIC OBJECTIVES

The student will be able to:

1. Explain basic operation of room air conditioners and dehumidifiers.
2. Describe various components of room air conditioners and dehumidifiers.
3. Identify the different types of cabinet configurations and construction methods.
4. Install, initially adjust and clean domestic window air conditioning units.
5. Utilize meters and test equipment to diagnose system electrical and mechanical malfunctions.
6. Describe the operation of control and electrical components used in room air conditioners and dehumidifiers.
7. Troubleshoot and correct common malfunctions of electrical control circuits in domestic units.
8. Maintain, service and repair basic mechanical components of domestic units.

### INSTRUCTIONAL CONTENT AND METHOD

1. Overheads and slides will be used during lecture hours.
2. Actual components will be shown during lecture and laboratory hours.
3. Laboratory equipment will be used for training and evaluation of proper service installation and repair methods.

### EVALUATION

1. At least one written test will be administered covering this material.
2. At least one shop evaluation will be given.

## UNIT III(16 nights)-RESIDENTIAL CENTRAL AIR CONDITIONING AND HEAT PUMP SYSTEMS

### SPECIFIC OBJECTIVES

The student will be able to:

1. Explain the theory of operation of heat pump systems.
2. Describe the basic operating cycles of central air conditioning and heat pump systems.
3. Explain application considerations for both cooling and heat pump systems.
4. Install, troubleshoot and maintain residential air conditioning and heat pump systems.
5. Identify and describe the operation of various components of central cooling and heat pump units including defrost systems (heat pumps only).
6. Describe the various types of control systems used in cooling and heat pump units.

7. Utilize schematic wiring diagrams for troubleshooting and determining sequence of operation.
8. Explain the operation of residential thermostats used in conjunction with cooling and heat pump systems and their wiring patterns.
9. Utilize meters and test equipment to diagnose systems electrical and mechanical malfunctions.

#### INSTRUCTIONAL CONTENT AND METHOD

1. Overheads and slides will be used during lecture hours.
2. Actual components will be demonstrated during classroom and laboratory hours.
3. Laboratory equipment will be used for training and evaluation of proper diagnosis, installation and repair methods.

#### EVALUATION

1. Two written tests will be administered covering this material.
2. Two shop evaluations will be administered covering this material

#### COURSE EVALUATION AND GRADING

While the exact procedure for grading will be up to the individual instructor the following will apply:

1. A written final examination must be taken covering all material presented in the course before the student can successfully complete the course.
2. Final grade will be determined by evaluating final exam results, test results, (4 tests maximum will be administered other than final), laboratory performance, attitude and attendance.
3. Extra credit work will not generally be recognized in evaluating student performance, however, individual instructors have limited flexibility in recognizing additional effort by an individual student.