ACR - 21 - Air Conditioning Fundamentals

Revised Curriculum Office Use Only

19-20 Revised Curriculum Use Only

Subject:* ACR

Course Number:* 21

Descriptive Title:* Air Conditioning Fundamentals

Course Disciplines:* Air Conditioning and Refrigeration, Heating

Division: Industry and Technology

Catalog Description:* This course is designed to introduce students to air conditioning and refrigeration theory and provide an overview of the skills needed for employment in the industry. Topics introduced include safety, air conditioning system operation and components, brazing, electrical applications, service tools and equipment.

Prerequisite:

Co-requisite:

Recommended Preparation:

Enrollment Limitation:

Course Length: ☑ Full Term

Hours Lecture (per week): 3

Hours Laboratory (per week): 3

Outside Study Hours:* 6

Total Hours:* 108

Course Units:* 4

Grading Method:

Grading Method: Letter Grade only

Credit Status: Credit, degree applicable

Transfer CSU: ☑ Yes ☐ No

Effective Date: Prior to July 1992

Transfer UC: ☐ Yes ☑ No

Effective Date:

General Education ECC:

Term:

Other:

CSU GE:

Term:

Other:

IGETC:

Term:

Other:

Student Learning Outcomes:

SLO #1 Window Air Conditioning Manifold Gauges
After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories placing refrigeration manifold gauges on an air conditioning system and check for correct charge of an operating system based on manufactures specification.

SLO #2 Component Brazing
After completion of this course, students will acquire the skills necessary to successfully braze refrigeration components to meet basic industry standards.

SLO #3 Basic HVACR Service
After completion of this course, students will have the knowledge necessary to perform basic HVACR service in a safe manner.

Course Objectives:

1. Complete a safety test with 100% accuracy.
2. Define air conditioning and methods of achieving it.
3. Compare and contrast refrigeration and air conditioning.
4. Diagnose operating and safety controls and switches.
5. Interpret and apply schematic wiring diagrams for air conditioning applications.
6. Measure and relate units of electricity.
7. Perform and log refrigeration system operations.
8. Create piping project diagram that demonstrates the students brazing, bending, flaring, and swaging skills.
9. Demonstrate knowledge of system refrigeration components and refrigerant flow.

Major Topics:

I. Air Conditioning and refrigeration overview (6 hours, Lecture)

1. Shop orientation
2. Safety and tools
3. Employment opportunities

II. Silver Brazing (15 hours, Lab)

1. Safety test and practices
2. Nomenclature
3. Cylinders and regulators
4. Torch and attachments

III. Air Conditioning Theory (12 hours, Lecture)

1. Components and functions
2. Refrigeration cycle

IV. Electrical Fundamentals (9 hours, Lecture)

1. Alternate and direct current theory
2. Source, path, and load
3. Units of electricity
4. Basic electrical laws and codes
5. Basic safety procedures
6. Proper use and care of volt, ohm, ammeters
7. Hermetic compressor efficiency analyzer

V. Electrical meter Fundamentals (10.5 hours, Lab)

1. Proper use and care of volt, ohm, ammeters
2. Hermetic compressor efficiency analyzer meter

VI. Electrical Fundamentals (10.5 hours, Lab)

1. Alternate and direct current theory
2. Source, path, and load
3. Units of electricity
4. Basic electrical laws and codes
5. Basic safety procedures
6. Proper use and care of volt, ohm, ammeters
7. Hermetic compressor efficiency analyzer

VII. Motors and Controls (15 hours, Lecture)

1. Types of motors
2. Compressor motor terminals
3. Relays, capacitors, overloads, contactors short, open and ground'
4. Air conditioning wiring diagrams

5. Necessary component replacement
6. Refrigerator check for recovery, pressure test
7. Evacuate and charge

VIII. Motors and Controls (18 hours, Lab)

1. Types of motors
2. Compressor motor terminals
3. Relays, capacitors, overloads, contactors short, open and ground
4. Air conditioning wiring diagrams
5. Necessary component replacement
6. Refrigerator check for recovery, pressure test
7. Evacuate and charge

IX. Types of pressure controls and safety cut outs (12 hours, Lecture)

1. High pressure control
2. Low pressure control

Total Lecture Hours: 54

Total Laboratory Hours: 54

Total Hours: 108

Primary Method of Evaluation 3) Skills demonstration

Typical Assignment Using Primary Method of Evaluation: Recover any refrigerant that may be in the system in a package air conditioner assigned to you. Evacuate the system to 500 microns and charge with electronic charging scale. Charge the system to the correct operating range. Report gauge manifold pressure and temperature readings on a two-page written data log report and submit to the instructor.

Critical Thinking Assignment 1: Troubleshoot a faulty package air conditioning unit. Diagnose the faulty components and specify the proper steps to troubleshoot each electrical component needed for repairing the system. Report troubleshooting findings of the air conditioning unit in a written one-page data log report and submit to the instructor.

Critical Thinking Assignment 2: Select the correct Heating, Ventilation and Air Conditioning (HVAC) components for a package air conditioning unit and assemble them on the electrical board in accordance with the electrical schematic provided. Wire in the system for proper operation of an air conditioning package unit. Submit the completed electrical board to the instructor.

Other Evaluation Methods: Class Performance | Completion | Homework Problems | Matching Items | Multiple Choice | Other Exams | Quizzes | True/False

If Other:

Instructional Methods: Demonstration | Group Activities | Lab | Lecture | Role play/simulation

If other:

Work Outside of Class Problem solving activity | Required reading | Skill practice | Study

If Other:

Up-To-Date Representative Textbooks: Althouse, Turnquist, Bracciano, Bracciano, and Bracciano. Modern Refrigeration and Air Conditioning. 21st edition. Goodheart Willcox, 2020

Alternative Textbooks:

Required Supplementary Readings:

Other Required Materials: Safety glasses

Workbook

Requisite

Category

Requisite course:

Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).

Requisite:

Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s), if applicable

Requisite course:

Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).

Requisite:

Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable

Enrollment Limitations and Category:

Enrollment Limitations Impact:

Course Created by: Raymond Havrella **Date:** 09/01/1986

Board Approval Date: **Last Board Approval Date:**

Last Reviewed and/or Revised by: Henry Der Antonian **Date:** 05/08/2020

Are these revisions minor or major?
- ○ minor
- ○ major