Course Information Form (CIF)

Course Code: PFT 217

Course Title: Basic Electricity and Refrigeration Controls

Department: Applied Sciences and Technologies
PCS Code: 1.2 - Occupational/Technical Instruction
CIP Code: 46.0503
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 1-6-3
Credit Hour Distribution:

Lecture: 1	Lab: 6	Clinical: 0	**Total: 3**

General Course Information

Catalog Description

Fundamentals of refrigeration and electricity. Refrigerants, basic evaporators/compressors, piping, and expansion devices. Testing and servicing of refrigeration equipment.

General Course Objectives

The apprentice will be able to explain the function of and demonstrate the installation of refrigeration systems.

Minimum Placement Levels

English	Reading	Math
Placement into ENG 098	Placement into CCS 098	Placement into MAT 059

Prerequisites

Admission into the Plumbers and Pipefitters Apprenticeship program

Methods of Evaluation

A minimum of 4 written exams and 6 practical exams are required.

Instructional Materials and Additional Supplies

Basic Electricity, International Pipe Trades Joint Training Committee, 2006. - Print Text
Conservation and Safe Handling of Refrigerants, IPTJTC, 2008. - Print Text
Air Conditioning, IPTJTC, 2002.

Course Content

General Learning Outcomes (GLOs)

- Technology: Students will demonstrate the ability to evaluate, select, and appropriately use current and emerging tools.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Fundamentals of Refrigeration	1. Apply basic science principles to trace the development of the vapor compression cycle. 2. Identify the characteristics and desirable properties of refrigerants. 3. List procedures for handling refrigerants and oils. 4. Read and interpret a pressure enthalpy diagram for a given refrigerant. 5. List and describe the major components of the vapor compression cycle. 6. Identify and describe the function of the basic types of evaporators and compressors. 7. Operate and maintain evaporative and air-cooled condensers. 8. List and describe the function of the various types of refrigerant piping accessories. 9. Describe the general principles which are involved in installing and troubleshooting refrigerant piping in a refrigeration system.	0.5	6	0
Basic Electricity Related to Refrigeration Systems	1. Apply basic electrical techniques as they relate to the refrigeration and air conditioning trade. 2. Define the terms: inductive reactance, capacitive reactance, and impedance in AC circuits.	2	3	0
Introduction to Thermostatic Expansion Control Systems and Troubleshooting	1. Explain the function and identify components of the thermostatic expansion valve in the mechanical refrigeration system. 2. Name the major types of charges for remote bulbs. 3. Install a simple thermostatic expansion valve and remote bulb. 4. Install the appropriate type of distributor with an external equalized valve. 5. Identify the major types of refrigerant distributors. 6. Install an external equalizer on a thermostatic expansion valve. 7. Identify and correct performance problems in the thermostatic expansion valve.	1	3	0
Special Application Expansion Valves: Requirements and Operation	1. Explain the function and operation of special expansion valves used in ammonia refrigerating systems, including but not limited to: ammonia expansion valves, pilot-operated expansion valves, pressure limiting expansion valves, and electric expansion valves.	1	2	0
Filter Driers/Moisture Liquid Indicators	1. Identify, install, and troubleshoot filter-drier and moisture-liquid indicators.	0.5	3	0
Liquid-line Solenoid Valves: Operation, Use, and Service	1. Explain the function of the liquid-line solenoid valve and solenoid pilot control valve.	0.5	0	0
Thermostatic Expansion Valves and Capacity Reduction	1. Explain the function of the thermostatic expansion valve on refrigeration and air conditioning systems with capacity reduction. 2. Control compressor pumping capacity with the hot-gas bypass system.	0.5	0	0
Suction Pressure Regulators	1. Identify and adjust suction, evaporator, and crankcase pressure regulators.	0.5	1	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Head Pressure Control Valves	1. Identify methods to control head pressure in a refrigeration or air conditioning system. 2. Troubleshoot head pressure-related complaints.	0.5	6	0
Low and High Side-Float Valves	1. Describe the applications of low and high side-float valves.	0.5	0	0
Refrigerant Piping Design and Arrangement	1. Arrange and install piping and piping materials for the most efficient operation of the refrigerant system.	0.5	6	0
Refrigerant Piping Installation	1. Plan, cut, and braze copper tubing and piping materials to erect refrigerant piping systems.	0.5	12	0
Intermediate Electrical Theory	1. Apply the basic electrical principles necessary to install and service refrigeration equipment.	0.5	6	0
Alternating-Current Motors	1. List the types of alternating current motors used in air conditioning and refrigeration systems.	0.5	0	0
Motor Overload Protection	1. Discuss the operation of industry recognized types of motor overload protectors. 2. Identify faults and troubleshoot for recommended repair.	0.5	3	0
Motor Controllers	1. List the principal features of a motor controller. 2. Identify motor controllers by type and function. 3. Troubleshoot and replace motor controllers.	0.5	3	0
Control of Refrigeration Equipment	1. Describe the operation of equipment used to maintain a desired temperature or humidity through use of refrigeration control equipment. 2. Identify control system types and prove correct operation.	0.5	6	0
Heat Pumps	1. Compare and contrast the advantages and disadvantages in installation of a heat pump system. 2. Identify heat pump systems and the major components.	1	6	0
Commercial and Low Temperature Refrigeration	1. Describe the function of specific types of commercial refrigerators.	0.5	0	0
Checking Refrigerant Temperatures and Pressures	1. Demonstrate the use of gauge manifolds to measure head and suction pressure. 2. Identify the safety precautions for operating pressures. 3. Test and recharge refrigerant system.	0.5	6	0
Refrigerant System Evacuation and Recharge	1. Identify equipment used to evacuate and recharge refrigerant systems. 2. Demonstrate the use of equipment to evacuate and recharge refrigerant systems.	0.5	6	0
Testing Electrical Components	1. Use electrical measuring devices to check the power supply of system components.	1	12	0
Startup and Maintenance Checklists	1. Describe industry standard startup procedures and how checklists can be used.	0.5	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
15	90	0