

207 **Refrigeration, Automatic Controls, Insulation**
Course No. Descriptive Title

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Course Description

This course focus on the practical applications of the knowledge and skills required to be productive in the refrigeration and air-conditioning industry. Emphasis is placed on digital electronic controls and system efficiency.

Suggested Prerequisites:109 Heating, Ventilation and Air Conditioning Design

Learning Outcomes

The student will be able to

1. Discuss applications for high-, medium-, and low temperature refrigeration
2. Describe the basic refrigeration cycle
3. Describe the function of the evaporator or cooling unit
4. Discuss the function of the condensing coil
5. Differentiate between CFCs, HCFCs, HFCs, and HCs
6. Describe and identify power-and non-power-consuming devices.
7. Describe several applications for electronic controls

Course Content:

1. Fundamentals, heat flow, melting ice to produce refrigeration, effect of pressure and temperature on the boiling point of a substance.
2. BTU, specific heat, latent heat, sensible heat, temperature, absolute pressure and temperature, transfer of heat by conduction, convection and radiation.
3. Refrigeration basic cycle showing all components and using R134a refrigerant.
4. Different types of compressors used in refrigeration systems including the following:
-reciprocating, rotary, scroll, screw, and centrifugal.
5. Different types of condensers used in refrigeration systems including air cooled and water cooled.
6. Different types of evaporators used in the refrigeration systems, and their purposes.
7. Purpose of the metering devices. Different types of metering devices used in the. refrigeration systems including the following: -hand operated, capillary tube, automatic expansion valve, thermostatic expansion valve, low side float, and high side float.
8. Use the psychrometric chart to plot dry bulb, wet bulb, dew point, relative humidity, and humidity. Do calculations involving enthalpy.
9. Examples of Charle's, Boyles, and Dalton's gas laws.
10. Using the pressure - enthalpy chart, plot the basic refrigeration cycle showing sub cooling and superheat and calculate various operating variables.
11. Characteristics of air flow using the fan law's. Air duct capacities. Heat load calculations of the refrigeration systems. Explanations about safety that includes the fire extinguisher and other safety requiremetns of the refrigeration service field.
12. Difference between CFC, HCFC, and HFC refrigerants and their effect on the ozone layer. Common refrigerants and their explanations. Different methods of leak detection for refrigerants and ammonia systems.
13. Explanation about why moisture is harmful in a refrigeration system, use of high vacuum pump in the system, construction and use of drier and placement of drier in the system.
14. Explanation about the piping in the refrigeration system, cooling towers, chillers, pumps, head pressure controls and all the automatic controls/accessories used in the refrigeration and air conditioning industry.

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Course Content (Continued):

15. Identify the different types and characteristics of motors as used in the HV ACR industry. Identify motor starting devices. Identify the different types and characteristics of overloads and electrical/mechanical controls.
16. Ohms law. Series and parallel circuits. Capacitance and impedance. Wye and delta circuits. Three phase motor starters.
17. Schematic and pictorial diagrams. Electrical troubleshooting about controls and wiring diagrams.
18. Explanations about the receiver and pump down cycle in the refrigeration system.

Required Textbooks and Materials:

1. Refrigeration & Air Conditioning Technology, 4th Edition , by Whitman/Johnson/Tomczyk - Delmar Publishers
2. Means Mechanical Estimating Standards and Procedures, by Moylan/Mossman.

Testing:

Emphasis will be placed on problem solving and the students' knowledge of:

1. Design criteria to be considered
2. Problem solving and design.
3. Practical applications

Examination Format:

All multiple-choice questions on the topics listed under Course Content above.