

HVA Heating, Ventilation, A/C, Refrigeration**HVA 101 Refrigeration Fundamentals (2-2) 3 crs.**

Introduces vocabulary, concepts and scientific principles used in the refrigeration and air conditioning industry. Studies theories on heat laws, pressures, matter, and energy; examines refrigerant chemistry and the refrigeration cycle. Covers proper refrigerant management techniques and safe practices. Emphasizes practical application, troubleshooting techniques, measuring and testing the operation of the basic refrigeration cycle; including working with ACR copper tubing, tools, and instruments.

Prerequisite: MTH 097 (Basic Technical Mathematics) with a grade of C or better, or consent of coordinator.

HVA 102 Refrigeration Systems (2-2) 3 crs.

Builds on concepts learned in HVA 101. Introduces specialized system controls and accessories found in commercial refrigeration systems. Covers pressure and temperature controls, water cooled condensers, commercial defrosting, and piping practices. Emphasizes practical application to develop diagnostic and troubleshooting techniques, interpret wiring diagrams, service, and repair; including working with zero ODP refrigerants used in commercial systems application.

Prerequisite: HVA 101 with a grade of C or better.

HVA 103 Heating Principles (2-2) 3 crs.

Introduces vocabulary, concepts and scientific principles used in the heating industry. Studies heat laws, heat transfer, and examines fundamentals of the combustion process. Covers gas, oil, and electric forced-air systems for residential comfort heating. Emphasizes practical application for testing and adjusting system performance, troubleshooting electrical systems and control, working with gas pipe, preventative maintenance, service and repair.

Prerequisite: MTH 097 (Basic Technical Mathematics) with a grade of C or better, or consent of coordinator.

HVA 104 Residential Comfort Systems (2-2) 3 crs.

Builds on concepts learned in HVA 101, HVA 103 and HVA 105. Incorporates additional systems' accessories and controls used to improve indoor air quality (IAQ). Examines psychrometrics principles, air flow measurements and basic residential air distribution systems. Emphasizes installation of residential HVAC systems, accessories and controls; includes basic concepts of duct design, sheet metal fabrication and installation.

Prerequisite: Prior or concurrent enrollment in HVA 103 (Heating Principles) with a grade of C or better, or consent of coordinator.

HVA 105 Heating and Cooling Controls (2-2) 3 crs.

Introduces electrical principles and concepts, electrical safety, electrical controls and electrical wiring diagrams utilized in residential and light commercial HVAC systems. Covers electrical symbols, Ohms' Law, series and parallel circuits, power distribution, magnetism, transformers, switches, relays, contactors, AC motors, motor starters and capacitors. Emphasizes the practical application for electrical system diagnosing; measuring volts, ohms and amps; troubleshooting, testing and adjusting electrical controls; interpreting wiring schematics, and wiring electrical circuits.

Prerequisite: MTH 097 (Basic Technical Mathematics) with a grade of C or better.

HVA 106 Pneumatic Controls Systems (2-2) 3 crs.

Builds on concepts learned in HVA 105. Introduces pneumatic system controls and accessories found in commercial heating and air-conditioning systems, and variable/constant air volume air handling units. Covers pneumatic relays, dampers, valve actuators, controller receivers, temperature and humidity controls, and air compressors. Emphasizes practical application to develop diagnostic and troubleshooting techniques, focusing on interpreting pneumatic diagrams, testing and measuring system components, service, repair and installation; and introduces commercial heating and cooling systems.

Prerequisite: HVA 105 with a grade of C or better.

HVA 107 Commercial Air Conditioning Systems (2-2) 3 crs.

Builds on concepts learned in HVA 101, HVA 105 and HVA 106. Focuses on air conditioning systems used in commercial buildings and their applications. Studies direct expansion systems, packaged units, and chilled-water systems. Covers rooftop units, variable refrigerant flow systems, air handling units, chillers and cooling towers. Emphasizes practical application, to develop troubleshooting techniques, perform system diagnostic/installation/preventative maintenance service and repairs. Includes fundamentals of air conditioning absorbers.

Prerequisite: HVA 101, 105 and 108 with grades of C or better, and prior or concurrent enrollment in HVA 106 with a grade of C or better.

HVA 108 Domestic Refrigeration Appliances (2-2) 3 crs.

Builds on concepts learned in HVA 101 and HVA 105. Introduces the application of the refrigeration cycle in respect to small appliances. Covers refrigerators, air conditioning and fundamentals of heat pump operations. Reviews work-safe practices, electrical system diagnostics, proper refrigerant handling and charging techniques, brazing and soldering copper tubing. Emphasizes practical application, operation, installation, maintenance, service and repairs.

Prerequisite: HVA 101 with a grade of C or better, and prior or concurrent enrollment in HVA 105 with a grade of C or better.

HVA 109 Commercial Heating Systems (2-2) 3 crs.

Builds on concepts learned in HVA 103, HVA 105 and HVA 106. Introduces low pressure steam and hot water boilers used in commercial heating. Studies heat laws, heat transfer theories, and examines the combustion process of gas, oil and coal. Covers boiler construction, boiler safe operating practices, pressure controls, and steam systems' accessories. Includes hydronic piping systems, circulating pumps and water treatment. Emphasizes practical application for boiler operation, preventive maintenance and service.

Prerequisite: HVA 103, HVA 105 and HVA 106 with grades of C or better.

HVA 110 Blueprints and Plans for HVAC (2-1) 2 crs.

Provides an introduction to architectural blueprints and mechanical drawings specific to HVAC systems. Examines types of construction, construction materials and working drawings. Emphasizes reading and interpreting architectural prints and mechanical drawings used in residential and commercial building. Covers mechanical, air distribution, electrical and plumbing systems. Includes an introduction to load calculations.

Prerequisite: Prior or concurrent enrollment in HVA 107 and HVA 109 with grades of C or better.

HVA 200 HVAC/R Mechanical Codes and Standards (2-1) 2 crs.

Examines HVAC systems code requirements for residential and light commercial buildings. Includes application of energy conservation standards, principles of building inspection, and proper equipment installation practices to discern code violations. Emphasizes practical application of safe practices, equipment layout, minimum installation requirements and legal ramifications for code violations.

Prerequisite: HVA 110 with a grade of C or better.

HVA 201 Refrigeration System Design (2-1) 2 crs.

Builds on concepts learned in HVA 101, HVA 102 and HVA 108. Examines the thermodynamic properties of refrigerants and their application for refrigeration system design. Covers factors in the selection of systems components including compressors, evaporators, condensers, metering devices and accessories used in commercial refrigeration systems. Studies the application of refrigerant line sizing selection.

Prerequisite: HVA 102 and HVA 108 with grades of C or better.

HVA 203 Load Calculations (2-1) 2 crs.

Studies methods used to calculate heat loss and heat gain for residential and light commercial structures to use to determine heating and cooling loads. Examines outdoor design temperature conditions, location, infiltration loads, composite material U-values and R-values. Emphasizes practical application for calculating building loads for equipment selection by performing load calculation using charts and data analysis from the Air Conditioning Contractors of America Manual J, abridged edition.

Prerequisite: HVA 110 with a grade of C or better.

HVA 204 Air Distribution (1-2) 2 crs.

Studies priorities of air flow for residential and light commercial structures to design HVAC duct systems for efficient air distribution. Covers duct sizing principles, air distribution systems, duct materials, system performance, blower performance, and grill selection. Emphasizes practical application for residential duct sizing by using charts and data analysis from the Air Conditioning Contractors of America Manual D. Includes performing duct testing and air balancing procedures.

Prerequisite: Prior or concurrent enrollment in HVA 203 with a grade of C or better.

HVA 205 Customer Service and Support (1-0) 1 cr.

Examines strategies to improve communication skills to make a positive first impression, and to provide customer service excellence with urgency and empathy in every customer interaction. Focuses on the importance of displaying good manners, maintaining a positive attitude and professional appearance. Emphasizes the development of strong communication skills to address customer inquiries by listening, answering questions and providing explanations in non-technical terms.