AIR COND & REFRIGERATION TECH (601)

Information provided includes course descriptions by subject only. For complete 2024-2025 programs/academic plans, please refer to Academic Programs (http://catalog.blackhawk.edu/academics/).

601-114 Industrial Comp Exam Review
Credits: 0.05-1

This course will be a comprehensive review of all applications and experiences from HVAC two year program at BTC. Students will engage in discussion and take practice exams that will enable them to hone their skills and knowledge in preparation for the Industrial HVAC Comprehensive Licensing Exam.
Aid Code: 10 - undefined.
Co-requisites: 601-186

Complete Course Listing

601-116 A/C Safety, Tools, Thermal Dynamics and HVAC Terminology
Credits: 0.5-1

A/C Safety, Tools, Thermal Dynamics and HVAC Terminology examines air conditioning safety, tools, thermal dynamics, terminology and math principles encountered in the HVAC/R industry.
Aid Code: 10 - undefined.

Complete Course Listing

601-117 A/C Components, Refrigeration Cycle and Refrigeration Gauges
Credits: 0.5-1

A/C Components, Refrigeration Cycle and Refrigeration Gauges examines matter and energy, introduces and analyzes the refrigeration cycle, examines refrigeration applied to air conditioning and teaches the installation of a refrigeration manifold gauge set on an operating residential split system.
Aid Code: 10 - undefined.
Co-requisites: (601-116)

Complete Course Listing

601-118 Air Flow Fundamentals
Credits: 0.5-1

Air Conditioning Fundamentals for HVAC/R 3 examines indoor air quality, introduces the has students practice using a psychrometeric chart, and examines air distribution of commercial and residential air conditioning systems as encountered in the HVAC/R servicing and installation business.
Aid Code: 10 - undefined.
Co-requisites: (601-117)

Complete Course Listing

601-121 Electrical Safety, Meter Usage and Ohm's Law
Credits: 0.5-1

Electrical Safety, Meter Usage and Ohm's Law examines electrical safety in HVAC/R, analyzes atomic structure and introduces electrical quantities. In addition, Ohm's Law formulas are introduced and utilized in lab activities that examine a simple series circuit. Electrical diagram reading and drawing will be integrated into the lab activities. This is a combination lecture/lab course involving hands on experience with basic electrical circuits.
Aid Code: 10 - undefined.

Complete Course Listing

601-122 Parallel Circuits, Combination Circuits and Capacitors
Credits: 0.5-1

Parallel Circuits, Combination Circuits and Capacitors examines Ohm's Law as it relates to parallel circuits and combination circuits. Electrical diagram reading and drawing will be integrated into the parallel and combination circuit lab activities. Capacitors will also be introduced in application and function. This is a combination lecture/lab course involving hands on experience with parallel, combination circuits, in-line ammeter usage and capacitor testing.
Aid Code: 10 - undefined.
Co-requisites: (601-121)

Complete Course Listing

601-123 Electrical Services, Wire Sizing and Electrical Diagrams
Credits: 0.5-1

Electrical Services, Wire Sizing and Electrical Diagrams examines electrical service, voltage systems and wire sizing. The effects of inductance and capacitance on an electric circuit will also be analyzed. In addition, electrical symbols and diagrams utilized in the HVAC/R industry will be analyzed through hands-on lab experiences.
Aid Code: 10 - undefined.
Co-requisites: (601-122)

Complete Course Listing

601-128 Print Reading for HVAC/R
Credits: 0.5-1

This course will cover print reading and standards relevant to the installation and service of residential and light commercial HVAC systems. This course is an Online course. Classroom attendance is not necessary but you can use the computers in the classroom during open lab hours. In addition, paper prints are available in the classroom if you prefer.
Aid Code: 10 - undefined.

Complete Course Listing

601-129 Mechanical Code
Credits: 0.5-1

This course continues to analyze the codes from prints, taking into consideration specific and unique building codes and standards relevant to the installation and service of residential and light commercial HVAC Systems.
Aid Code: 10 - undefined.

Complete Course Listing

601-131 Access Valves, Compressors and Condensers
Credits: 0.5-1

This course will provide students with the opportunity to practice accessing sealed air-conditioning and refrigeration units utilizing a manifold gauge set. Additionally, students will practice testing and troubleshooting compressors and condensers.
Aid Code: 10 - undefined.
Co-requisites: 601-117

Complete Course Listing

601-132 Evaporators, Metering Devices and Accessories
Credits: 0.5-1

Evaporators, Metering Devices and Accessories will examine the process and tools required to gain access to a sealed system and develop a better understanding of the system metering devices and evaporations.
Aid Code: 10 - undefined.
Co-requisites: (601-131)

Complete Course Listing

601-133 Heat Transfer Principles and Manual J
Credits: 0.5-1

Heat Transfer Principles and Manual J teaches the fundamentals of heat transfer through different types of construction materials. Students will perform residential load calculations using ACCA Manual J8ae and computerized ACCA load calculation spread sheets.
Aid Code: 10 - undefined.

Complete Course Listing

601-134 Wrightsoft Load Calculations and RESCheck
Credits: 0.5-1

Wrightsoft Load Calculations and RESCheck utilizes Wrightsoft to perform residential and commercial load calculations and duct sizing. In addition, RESCheck will be analyzed and applied to check structures code conformity for heat loss. The student will develop an understanding of energy conservation through the appropriate analysis and application of size and selection of HVAC equipment.
Aid Code: 10 - undefined.

Complete Course Listing

601-136 Split Phase Motor Identification, Testing and Replacement
Credits: 0.5-1

Split Phase Motor Identification, Testing and Replacement is designed to examine motor identification, motor troubleshooting procedures and fan motor replacement. This course also reviews the basics of electrical theory and safety.
Aid Code: 10 - undefined.
Pre-requisites: 601-122

Complete Course Listing

601-137 Variable Speed Motors, Current Relays, Potential Relays and PTC Relays
Credits: 0.5-1

Variable Speed Motors, Current Relays, Potential Relays and PTC Relays examines how to wire and troubleshoot single phase motor starting components. In addition, students test the operation of ECM motors.
Aid Code: 10 - undefined.
Co-requisites: (601-136)

Complete Course Listing

601-138 Transformers, Contactors, Relays and Motor Starters
Credits: 0.5-1

Transformers, Contactors, Relays and Motor Starters will introduce students to transformers, contactors, relays and motor starters. Students will gain hands-on experience through the application and analysis of wired lab boards and testing on HVAC/R equipment.
Aid Code: 10 - undefined.
Co-requisites: 601-136

Complete Course Listing

601-141 Gas Pipe Sizing, Gas Regulators and Gas Valves
Credits: 0.5-1

Gas Pipe Sizing, Gas Regulators and Gas Valves will examine the principles of natural gas heat as applied to residential heating systems. In addition, the student will apply proper gas piping techniques and will gas pipe a residential furnace. Testing/adjusting gas pressure on gas regulators and gas valves will also be analyzed and completed.
Aid Code: 10 - undefined.

Complete Course Listing

601-142 Residential Gas Furnaces
Credits: 0.5-1

Residential Gas Furnaces will study gas heating operating and safety controls. Testing of these controls on residential and light commercial heating systems will be practiced and applied.
Aid Code: 10 - undefined.
Co-requisites: (601-141)

Complete Course Listing

601-143 Electric Heat and Air-to-Air Residential Heat Pump Systems
Credits: 0.5-1

Electric Heat and Air-to-Air Residential Heat Pump Systems will teach residential clean/tunes, the operation and testing of electric baseboard heating systems and split system air to air residential heat pumps with electric heat.
Aid Code: 10 - undefined.
Co-requisites: (601-142)

Complete Course Listing

601-146 Flaring, Swagging and Soldering Copper Pipe
Credits: 0.5-1

Flaring, Swagging and Soldering Copper Pipe utilizes safe copper piping industry skills. Students will learn to use tools to cut, ream, flare, bend and anneal copper pipe to specifications. Copper piping assemblies will be measured and cut to specifications and soldered in a variety of orientations to simulate a variety of real life applications.
Aid Code: 10 - undefined.

Complete Course Listing

601-147 Air Acetylene and Oxy-Acetylene Brazing Copper Pipe
Credits: 0.5-1

Air Acetylene and Oxy-Acetylene Brazing Copper Pipe has students measure and cut copper pipe to specifications and braze in a variety of orientations to simulate a variety of real life applications utilizing both air acetylene and oxy-acetylene.
Aid Code: 10 - undefined.

Complete Course Listing

601-148 Refrig Recov, Deep Evac and Charging of Residential, Light Commercial, Geothermal and Ice Mach Equip
Credits: 0.5-1

Refrigeration Recovery, Deep Evacuation and Charging of Residential, Light Commercial, Geothermal and Ice Machine Equipment has students recover refrigerant from a cylinder, residential split system, light commercial package gas/electric system, geothermal heat pump and an ice machine. After the refrigerant is recovered the student will perform a deep evacuation on the system. After the appropriate evacuation level is achieved, the student will utilize the manufacturer's literature and charge the system with the correct amount of refrigerant. Refrigerant handling and safety will be enforced in the lab.
Aid Code: 10 - undefined.
Co-requisites: 601-132

Complete Course Listing

601-149 Refrig Recovery, Triple Evacuation and Charging of Heat Pumps and Refrig Equipment and EPA Test
Credits: 0.5-1

Refrigeration Recovery, Triple Evacuation and Charging of Heat Pumps and Refrigeration Equipment and EPA Test will have the student recover refrigerant from a residential split heat pump system, a mini-split heat pump system, a walk-in cooler system and a reach-in frozen food system. After the refrigerant is recovered the student will perform a triple evacuation on the system. After the appropriate evacuation level is achieved, the student will utilize the manufacturer's literature and charge the system with the correct amount of refrigerant. After the student has mastered the skills of recovery, evacuation, and charging the EPA Section 608 test will be administered. Refrigerant handling and safety will be enforced in the lab.
Aid Code: 10 - undefined.
Co-requisites: (601-148)

Complete Course Listing

601-151 Residential Split and Light Commercial Package Gas/Electric Cooling Applications
Credits: 0.5-1

Residential Split and Light Commercial Package Gas/Electric Cooling Applications provides the student with hands-on servicing experience of window air conditioners, residential split systems, packaged light commercial air conditioners.
Aid Code: 10 - undefined.
Co-requisites: (601-132) and (601-138)

Complete Course Listing

601-152 Residential Air-to-Air and Geothermal Heat Pump Systems Cooling Applications
Credits: 0.5-1

Residential Air-to-Air and Geothermal Heat Pump Systems Cooling Applications provides students with hands-on servicing experience of air-to-air heat pumps, geothermal heat pumps and water cooled unitary cooling systems.
Aid Code: 10 - undefined.
Co-requisites: (601-132) and (601-138)

Complete Course Listing

601-153 Commercial - Package, Split DX and Chilled Water A/C Applications
Credits: 0.5-1

Commercial - Package, Split DX and Chilled Water A/C Applications provides students with hands-on servicing experience on high efficiency packaged commercial air conditioners, commercial split systems and water to air commercial chiller systems.
Aid Code: 10 - undefined.
Co-requisites: (601-132) and (601-138)

Complete Course Listing

601-156 Refrigeration and HVAC Temperature Control Systems
Credits: 0.5-1

Refrigeration and HVAC Temperature Control Systems tests the operation of transformers, capacitors, relays, contactors and motor starters on HVAC/R systems. In addition, wiring diagrams will be created from circuit descriptions for temperature controls, solenoids, thermostats and defrost clocks. The wiring diagrams will be used to wire these components on lab boards. Testing of temperature controls, solenoids, thermostats and defrost clocks and on actual equipment will be performed as well.
Aid Code: 10 - undefined.
Co-requisites: 601-138

Complete Course Listing

601-157 Refrigeration and A/C Control Systems
Credits: 0.05-1

Refrigeration and A/C Control Systems is designed to teach the applications of the high pressure control, low pressure control and oil pressure safety control on a refrigeration system. Students will draw the pictorial and schematic wiring diagrams for the recycling and non-recycling pump down circuit. In addition, the student will wire and test pump down controls on lab boards and test the pump down control system on a reach-in frozen food system. Finally, the students will test the operation of the KE2 energy management refrigeration pump down control system utilizing the front end controller and internet-based control system.
Aid Code: 10 - undefined.
Co-requisites: (601-156)

Complete Course Listing

601-158 Heating and Package Gas/Electric Control Systems
Credits: 0.05-1

Heating and Package Gas/Electric Control Systems teaches gas heating control system and package gas electric control systems. Students will test the control system operation on direct fired residential furnaces. In addition, students will wire and test indirect ignition control systems on lab boards and on heating systems. Finally students will test the control system on a package gas/electric package unit.
Aid Code: 10 - undefined.
Co-requisites: 601-142

Complete Course Listing

601-161 Advanced Compressors, Condensers, Metering Devices, and Evaporators
Credits: 0.5-1

Advanced Compressors, Condensers, Metering Devices, and Evaporators examines cylinder handling safety and refrigerant safety. In addition, refrigeration service valves will be adjusted and set to achieve gauge readings and to pump down a system. Air conditioning and refrigeration evaporators and condensers will be tested under various load conditions. Advanced compressor and metering device applications will also be tested.
Aid Code: 10 - undefined.
Co-requisites: (601-132)

Complete Course Listing

601-162 Walk-in Coolers/Freezers and Reach-in Freezers
Credits: 0.5-1

Walk-in Coolers/Freezers and Reach-in Freezers teaches students to test the operation of reach-in freezers and walk-in freezers. Through hands-on lab activities, students will review the refrigeration fundamentals and apply these to fix and troubleshoot operation of varying units.
Aid Code: 10 - undefined.
Co-requisites: 601-161

Complete Course Listing

601-163 Ice Machines
Credits: 0.5-1

Students in this course will test the operation of cube and flake ice machines. Through hands-on lab activities, students will review the refrigeration fundamentals and apply these to fix and troubleshoot operation of varying units.
Aid Code: 10 - undefined.
Co-requisites: 601-161

Complete Course Listing

601-166 Residential, Light Commercial Package Gas/Electric and Refrigeration Control Systems
Credits: 0.5-1

Residential, Light Commercial Package Gas/Electric and Refrigeration Control Systems covers the advanced control circuit applications applied to residential split systems, package gas/electric systems and refrigerated fixtures with remote condensing units. In addition, an E2 system controlling a reach-in frozen food case will be programmed and tested.
Aid Code: 10 - undefined.
Pre-requisites: (601-158)

Complete Course Listing

601-167 Commercial Package Gas/Electric BAS
Credits: 0.5-1

Commercial Package Gas/Electric BAS has students test the operation of Trane Precedent and Voyager Constant Volume RTUs through the Trane SC energy management system. In addition, the Lennox Prodigy system will be tested and results analyzed on a RTU.
Aid Code: 10 - undefined.
Pre-requisites: (601-158)

Complete Course Listing

601-168 Commercial Split and Geothermal BAS
Credits: 0.05-1

Commercial Split and Geothermal BAS will have the KE2 Low Temp + Defrost control system tested. In addition, Trane SC control of a commercial air handler with a DX split system and an in-line duct furnace supplying air to zoned re-heat boxes will be tested. Also a commercial air handler with a chiller and chilled water coil, a hydronic boiler and hot water coil hot with zoned water re-heat coils will be tested. Finally, the Trane SC wireless energy management system controlling the operation of the geothermal heat pumps will be tested.
Aid Code: 10 - undefined.
Pre-requisites: (601-158)

Complete Course Listing

601-170 Heating, Ventilation, Air Conditioning and Refrigeration (HVAC/R) Service Internship
Credits: 1-3

Students will have the opportunity to apply their classroom experience on the job. Local HVAC/R contractors have shown great interest in the program and are willing to accept students for internship. Internship time can be accrued throughout the two-year program to achieve a total of 108 hours.
Aid Code: 10 - undefined.

Complete Course Listing

601-171 Residential Split System Gas and Refrigeration Pipe Installation
Credits: 0.5-1

Residential Split System Gas and Refrigeration Pipe Installation teaches the student to install black gas pipe and ACR piping on a split residential system. The student will perform basic residential load calculation and duct sizing using industry standard software. The student will use information gathered to select the correct HVAC system for the application. The student will install a gas fired furnace along with a condensing unit, evaporator, gas piping and refrigeration piping.
Aid Code: 10 - undefined.
Co-requisites: (601-141) and (601-147)

Complete Course Listing

601-172 Residential Split System Duct and Controls System Installation and Start-up
Credits: 0.5-1

In Residential Split System Duct and Controls System Installation and Start-up students will be involved in the fabrication and installation of duct work on a residential furnace. In addition, a zoning control system will be installed by students and start up tests will be performed per manufacturers' instruction.
Aid Code: 10 - undefined.
Co-requisites: (601-171)

Complete Course Listing

601-173 Split Refrigeration System Installation
Credits: 0.5-1

In Split Refrigeration System Installation students will be involved in piping, wiring and starting-up of a refrigeration pump down system. The system tests will be performed and checked by students using industry standards.
Aid Code: 10 - undefined.
Co-requisites: (601-147) and (601-157)

Complete Course Listing

601-176 Residential Oil Heat, Duel Fuel Systems and Two Stage Heat Pump Heating Applications
Credits: 0.5-1

Residential Oil Heat, Duel Fuel Systems and Two Stage Heat Pump Heating Applications teaches residential oil furnaces, dual fuel heating systems and residential 2 stage heat pumps. Students will be introduced to the various components that make up these systems and will be able to troubleshoot, maintain and service this equipment per manufacturer's instructions.
Aid Code: 10 - undefined.
Co-requisites: (601-142)

Complete Course Listing

601-177 Mini-Split, Light Commercial Gas/Electric Package and Unit Heater Heating Applications
Credits: 0.5-1

Mini-Split, Light Commercial Gas/Electric Package and Unit Heater Heating Applications teaches mini-split heat pump systems, gas fired unit heaters and light commercial gas/electric systems. Students will be introduced to the various components that make up these systems and will be able to troubleshoot, maintain and service this equipment per manufacturer's instructions.
Aid Code: 10 - undefined.
Co-requisites: (601-142)

Complete Course Listing

601-178 Commercial-Package Gas/Electric , Hydronic and In-Line Duct Heating Applications
Credits: 0.5-1

Commercial-Package Gas/Electric , Hydronic and In-Line Duct Heating Applications teaches commercial package gas/electric systems. This class will also instruct on commercial air handlers with in-line duct furnace and electric zone re-heat VAVS. Finally students will receive instruction on commercial air handlers with hydronic heat and hot water VAV re-heat coils. Students will be introduced to the various components that make up these systems and will be able to troubleshoot, maintain and service this equipment per manufacturer's instructions.
Aid Code: 10 - undefined.
Co-requisites: (601-142)

Complete Course Listing

601-181 Hydronic Systems Theory
Credits: 0.5-1

Hydronic Systems Theory involves instruction on system design of hydronic and steam systems. Students will be able to distinguish the differences between systems and have an understanding of the different applications for each system.
Aid Code: 10 - undefined.
Co-requisites: (601-142)

Complete Course Listing

601-182 Hydronic Systems Installation and Start-up
Credits: 0.5-1

In Hydronic Systems Design and Mechanical Installation, students install and start-up the systems they designed in Hydronic Systems Theory.
Aid Code: 10 - undefined.
Co-requisites: (601-143) and (601-146) and (601-181)

Complete Course Listing

601-183 Hydronic and Steam System Service
Credits: 0.5-1

Hydronic and Steam System Service instructs students in the service and maintenance of steam and hydronic heating systems.
Aid Code: 10 - undefined.
Co-requisites: (601-182)

Complete Course Listing

601-184 Service and Troubleshooting HVAC/R 1
Credits: 0.5-1

Students will apply various methods of troubleshooting and servicing of HVAC/R systems. Utilizing manufacturer's guidelines and service tools, the student will demonstrate customer relations, mechanical aptitude and bookkeeping skills that are essential to becoming a well rounded service technician.
Aid Code: 10 - undefined.
Co-requisites: (601-143) and (601-153) and (601-158) and (601-163)

Complete Course Listing

601-185 Service and Troubleshooting HVAC/R 2
Credits: 0.5-1

This course is a continuation of Service and Troubleshooting HVAC/R 1. Students will continue to apply various methods of troubleshooting and servicing of HVAC/R systems. Utilizing manufacturer's guidelines and service tools, the student navigate customer relations, display mechanical aptitude and demonstrate bookkeeping skills that are essential to becoming a well rounded service technician.
Aid Code: 10 - undefined.
Pre-requisites: (601-143) and (601-153) and (601-158) and (601-163)

Complete Course Listing

601-186 Service and Troubleshooting HVAC/R 3
Credits: 0.5-1

This course is a continuation of Service and Troubleshooting HVAC/R 2. Students will continue to analyze and troubleshoot issues while servicing HVAC/R systems. Utilizing manufacturer's guidelines and service tools, the student navigate customer relations, display mechanical aptitude and demonstrate bookkeeping skills that are essential to becoming a well rounded service technician.
Aid Code: 10 - undefined.
Pre-requisites: (601-143) and (601-153) and (601-158) and (601-163)

Complete Course Listing

601-400 NATE Test Review
Credits: 0.1-0.4

Aid Code: 47 - undefined.

Complete Course Listing

601-999E EPA 608 Test
Credits: 0

The EPA 608 Test satifies Section 608 of the Federal Clean Air Act requiring all persons who maintain, service, repair or dispose of appliances that contain regulated refrigerants be certified in proper refrigerant handling techniques. Based on space available, testing dates are flexible. For more information on these tests and to schedule a time/ date to take the test please contact (608) 757-7635.
Aid Code: 99 - undefined.

Complete Course Listing

601-999N Nate Test
Credits: 0

Aid Code: 99 - undefined.

Complete Course Listing