Heating, Ventilation and Air Conditioning
Program Guide

Technical Certificate Requirements

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<th>Course Title</th>
<th>Credits</th>
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<td>ENV 102 Safety Orientation (OSHA 10)</td>
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<td>HVA 154 Gas Heating</td>
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<td>HVA 104 Electrical Fundamentals</td>
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<td>HVA 159 A/C, Heat Pumps, Electric Heat</td>
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<td>HVA 109 Controls and Motors</td>
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<td>HVA 164 RTU Heating and A/C</td>
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<td>HVA 114 Heating System Fundamentals</td>
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<td>Recovery, Condensers</td>
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<td>HVA 119 HVAC Fundamentals</td>
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<td>HVA 124 Compressor and Refrigeration Controls</td>
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<td>Metering Devices and Controls</td>
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<td>HVA 129 Sheet Metal Layout and Fabrication</td>
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<td></td>
<td>Motor Controls and Ice Machines</td>
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<td>Semester Total</td>
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<td>Total Technical Education Credits</td>
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Associate of Applied Science Degree Requirements

Required Technical Courses
Heating, Ventilation, and Air Conditioning Technical Certificate 36

Related Technical Electives
Any Computer Aided Drafting, Construction, Electronic Technology, Electrical Technology, or Environmental Technology 9

General Education (course numbers 100 or above)
Verbal Communications 3
Written Communications 3
Mathematics, and/or Computer Science 6
Social Sciences and/or Humanities and Fine Arts 3

Technical Certificate 36
Related Technical Electives 9
General Education 15
Total AAS Credits 60

Admission Criteria

- Successfully complete applicable preadmission testing and/or advising

Heating and air-conditioning systems control the temperature, humidity, and the total air quality in residential and commercial buildings. Refrigeration makes it possible to store and transport food, medicine, and other perishable items. Heating, air-conditioning, and refrigeration technicians install, maintain, and repair such systems. Salina Tech HVAC students work on a variety of new and old furnaces, air conditioners, heat pumps, reach-in and walk-in coolers, ice machines and sheet metal equipment. Diagnosing problems, controlling computerized systems, repairing and charging units, and building duct work are among some of the areas covered in the shop and at customer work sites. This program prepares students in nine months to work in residential or commercial settings earning competitive wages.
Career Opportunities: Commercial and Domestic Service Technician, Service Manager, Business Owner, Installers

Course Descriptions

**HVA 104 Electrical Fundamentals, 4 credits. (Prerequisites: ENV 102)**
Upon successful completion of this course, the student should be able to identify electrical components. The materials in this course will prove useful to service technicians whose background in electricity is limited. This course will provide practice in application of electrical theory as well as in the interconnection of components of heating and cooling systems.

**HVA 109 Controls and Motors, 3 credits. (Prerequisite: HVA 104)**
In this course students identify different types of motors, and acquire an understanding of the internal parts of the motors. Students will be able to identify the difference in start and run capacitors. The course also covers transformers, relays, switches and fuses.

**HVA 114 Heating Systems Fundamentals, 3 credits. (Prerequisite: HVA 109)**
Upon successful completion of this course, the student should be able to identify all the components and accessories and their relation to the functions of residential heating systems. Topics covered include: natural gas, propane, forced air and hydronic-types of equipment. Emphasis is on the electrical diagrams and mechanical principles of operation of these systems, as well as practical instruction in service diagnosis procedures and techniques for efficient operation, maintenance, troubleshooting and repair of these systems.

**HVA 119 HVAC Fundamentals, 4 credits. (Prerequisites: DAT test, ENV 102)**
Students learn to identify the function of the basic components of an air-conditioning system. Topics include refrigerant piping, flare connections, soldering, brazing, temperature and pressure measurements, as well as trade math.

**HVA 124 Compressor and Refrigeration Controls, 3 credits. (Prerequisite: HVA 119)**
This course covers different types of compressors and their functions, as well as the complete Freon circuit of commercial refrigeration units. The student will be able to name the components in the systems, and have an understanding of how refrigerant flows through systems and be able to verify the state that the Freon is in throughout the system.

**HVA 129 Sheet Metal Layout and Fabrication, 2 credits. (Prerequisites: DAT test, ENV 102)**
Upon successful completion of this course, the student should be able to identify the components, equipment and operation for sheet metal layout and fabrication. Students are provided opportunities to apply the methods learned. Patterns are fabricated and joined into a line of fittings.

**HVA 134 Refrigeration Fundamentals, 2 credits. (Prerequisites: HVA 124, HVA 129)**
This course covers cover color coding, CFC, HCFC and HFC refrigerant types. The students will also use temperature-pressure charts. This course will also cover charging procedures for cooler and freezers. During this course business tips will be covered.

**HVA 154 Gas Heating, 4 credits. (Prerequisite: HVA 114)**
This course goes farther in depth on maintenance and troubleshooting of residential gas heating systems. Topics covered include: thermostats, safety controls, blowers, gas pressure, air flow, heat exchangers, service and ECM motors.
HVA 159 A/C, Heat Pumps, Electric Heat, 4 credits. (Prerequisite: HVA 154)
Students learn to identify all the components and accessories and their relation to the functions of residential air conditioning systems. Topics covered include electric air conditioner condensing units, metering devices, and refrigerants. Students identify the function of all components and accessories of all electric and dual heat pump systems. Additional topics include electric heat and heat pump fundamentals, principles and applications; refrigerant flow controls; defrost cycle controls; heat pump thermostats; indoor air distribution; dual fuel controls; and change-over stats. Emphasis is on the electrical diagrams and mechanical principles of operation, as well as practical instruction in service and diagram procedures and techniques for the efficient operation, maintenance, troubleshooting and repair of these systems.

HVA 164 RTU Heating and A/C, 3 credits. (Prerequisite: HVA 159)
This course covers Roof Top Units, air conditioning, heating, motors, and controls. Emphasis is on the electrical diagrams and mechanical principles of operation, as well as practical instruction in service and diagram procedures and techniques for the efficient operation, maintenance, troubleshooting and repair of these systems.

HVA 169 Commercial Refrigeration, Evaporators, Recovery, Condensers, 3 credits. (Prerequisite: HVA 134)
This course covers temperature ranges, TDs, evaporators, defrost, recovery, evacuation, condenser split and cleaning condensers and evaporators. The course will also cover refrigeration, evaporators and condensers in great detail.

HVA 174 EPA 608, 1 credits.
This course prepares students for the EPA Section 608 exam. Topics covered include the legal handling of refrigerants, cooling equipment components and basic refrigeration theory, substitute refrigerants and oils, refrigerant cylinder safety procedures, ozone depletion, the Clean Air Act No Venting Law, EPA regulations, and safety and recovery procedures for Type I, II and III technicians.

HVA 179 Commercial Refrigeration Compressors, Metering Devices and Controls, 3 credits. (Prerequisite: HVA 169)
This course covers types of compressors and their failures, how to figure compression ratios, superheat and troubleshooting TEVs and cap tubes.

HVA 184 Workplace Skills, 1 credits.
Students learn the job skills necessary to have a successful career in the field of their choice. Topics include listening skills, oral communication, human relations, decision making, problem solving, teamwork, time and resource management, work ethics and career planning.

HVA 189 Commercial Refrigeration Troubleshooting, Motor Controls and Ice Machines, 3 credits. (Prerequisite: HVA 179)
This course covers troubleshooting the refrigeration circuit in great detail, as well as troubleshooting motors and controls, and ice machine service and troubleshooting.