

# HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

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- Heating, Ventilation and Air Conditioning (HVAC) Certificate ([coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/advanced-hvac-certificate/](http://coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/advanced-hvac-certificate/))
- Heating, Ventilation and Air Conditioning (HVAC) AAS Degree ([coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/advanced-hvac-aas/](http://coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/advanced-hvac-aas/))
- Dual Credit Heating, Ventilation and Air Conditioning (HVAC) Certificate ([coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/hvac-certificate-high-school-pathway/](http://coursecatalog.tvcc.edu/pathways/service-production-industry/hvac/hvac-certificate-high-school-pathway/))

## Heating, Ventilation, & Air Conditioning Program Information

**Note: Criminal history may disqualify individuals from obtaining or maintaining any HVAC certifications.**

### Texas law:

- restricts the issuance of occupational licenses based on a license applicant's criminal history; and
- authorizes the Texas Department of Licensing and Regulation (TDLR), in some cases, to consider a person convicted, even though the person was only on probation or community supervision without a conviction.

Individuals who have been convicted of an offense or placed on probation might not be eligible for an occupational license issued by TDLR even after completing an educational or training program;

TDLR's criminal history guidelines are available at [www.tdlr.texas.gov/crimconvict.htm](http://www.tdlr.texas.gov/crimconvict.htm) (<http://www.tdlr.texas.gov/crimconvict.htm>) and include restrictions or guidelines TDLR uses to determine eligibility for an occupational license; and individuals have the right to request a criminal history evaluation letter from TDLR, which is explained in more detail at [www.tdlr.texas.gov/crimhistoryeval.htm](http://www.tdlr.texas.gov/crimhistoryeval.htm) (<http://www.tdlr.texas.gov/crimhistoryeval.htm>).

### **HART-1300. HVAC Duct Fabrication. (3 Credits)**

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Layout and fabrication of HVAC duct systems using common tools and equipment of the trade. Lab Fee.

### **HART-1301. Basic Electricity for Hvac. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Principles of electricity as required by HVAC, including proper use of test equipment, electrical circuits, and component theory and operation. Lab Fee.

**HART-1303. Air Conditioning Control Principles. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A basic study of HVAC and refrigeration controls; troubleshooting of control components; emphasis on use of wiring diagrams to analyze high and low voltage circuits; a review of Ohm's law as applied to air conditioning controls and circuits. Lab Fee.

**HART-1307. Refrigeration Principles. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to the refrigeration cycle, heat transfer theory, temperature/pressure relationship, refrigerant handling, refrigeration components and safety. Lab Fee.

**HART-1341. Residential Air Conditioning. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A study of components, applications, and installation of mechanical air conditioning systems including operating conditions, troubleshooting, repair and charging of air conditioning systems. Lab Fee.

**HART-1345. Gas and Electric Heating. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Study of the procedures and principles used in servicing heating systems including gas fired furnaces and electric heating systems. Lab Fee.

**HART-2336. Air Conditioning Troubleshooting. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An advanced course in application of troubleshooting principles and use of test instruments to diagnose air conditioning and refrigeration components and system problems including conducting performance tests. Lab Fee.

**HART-2338. Air Conditioning Installation and Startup. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A study of air conditioning system installation, refrigerant piping, condensate disposal, and air cleaning equipment with emphasis on startup and performance testing. Lab Fee.

**HART-2345. Residential Air & Conditioning Systems Design. (3 Credits)**

(3-2-2) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Study of the properties of air and results of cooling, heating, humidifying or dehumidifying; heat gain and heat loss calculations including equipment selection and balancing the air system. Lab Fee.

**ELPT-1311. Basic Electrical Theory. (3 Credits)**

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Basic theory and practice of electrical circuits. Includes calculations as applied to alternating and direct current. Lab fee.

## What Heating, Air Conditioning, and Refrigeration Mechanics and Installers Do (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-2>)

Heating, air conditioning, and refrigeration mechanics and installers—often called *HVACR technicians*—work on heating, ventilation, cooling, and refrigeration systems that control the temperature and air quality in buildings.

### Duties

Heating, air conditioning, and refrigeration mechanics and installers typically do the following:

- Install, clean, and maintain HVACR systems
- Install electrical components and wiring
- Inspect and test HVACR systems and components
- Discuss system malfunctions with customers
- Repair or replace worn or defective parts
- Recommend maintenance to improve system performance
- Keep records of work performed

Heating and air conditioning systems control the temperature, humidity, and overall air quality in homes, businesses, and other buildings. By providing a climate-controlled environment, refrigeration systems make it possible to store and transport food, medicine, and other perishable items.

Some HVACR technicians specialize in one or more specific aspects of HVACR, such as radiant heating systems, solar panels, testing and balancing, or commercial refrigeration.

When installing or repairing air conditioning and refrigeration systems, technicians must follow government regulations regarding the conservation, recovery, and recycling of refrigerants. The regulations include those concerning the proper handling and disposal of fluids and pressurized gases.

Some HVACR technicians sell service contracts to their clients, providing periodic maintenance of heating and cooling systems. The service usually includes inspecting the system, cleaning ducts, replacing filters, and checking refrigerant levels.

Other workers sometimes help HVACR technicians install or repair cooling and heating systems. For example, on a large air conditioning installation job, especially one in which workers are covered by union contracts, ductwork may be installed by sheet metal workers (<https://www.bls.gov/ooh/construction-and-extraction/sheet-metal-workers.htm>), electrical work by electricians (<https://www.bls.gov/ooh/construction-and-extraction/electricians.htm>), and pipework by plumbers, pipefitters, and steamfitters (<https://www.bls.gov/ooh/construction-and-extraction/plumbers-pipefitters-and-steamfitters.htm>). Boiler systems are sometimes installed by a boilermaker (<https://www.bls.gov/ooh/construction-and-extraction/boilermakers.htm>).

Home appliance repairers usually service window air conditioners and household refrigerators.

**SUMMARY** (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm>)

- Heating, air conditioning, and refrigeration mechanics and installer
- 2018 Median Pay: \$47,610 per year, \$22.89 per hour
- Typical Entry-Level Education: Postsecondary non-degree award
- Work Experience in a Related Occupation: None
- On-the-job Training: Long-term on-the-job training
- Number of Jobs, 2018: 367,900
- Job Outlook, 2018-28: 13% (Much faster than average)
- Employment Change, 2018-28: 46,300

**Work Environment** (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-3>)

HVACR technicians work mostly in homes, schools, hospitals, office buildings, or factories. Their worksites may be very hot or cold because the heating and cooling systems they must repair may not be working properly and because some parts of these systems are located outdoors. Working in cramped spaces and during irregular hours is common.

**How to Become a Heating, Air Conditioning, or Refrigeration Mechanic and Installer** (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-4>)

Because HVACR systems have become increasingly complex, employers generally prefer applicants with postsecondary education or those who have completed an apprenticeship. Some states and localities may require technicians to be licensed.

**Pay** (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-5>)

The median annual wage for heating, air conditioning, and refrigeration mechanics and installers was \$47,610 in May 2018.

**Job Outlook** (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-6>)

Employment of heating, air conditioning, and refrigeration mechanics and installers is projected to grow 13 percent from 2018 to 2028, much faster than the average for all occupations. Commercial and residential building construction is expected to drive employment growth, and job opportunities for HVACR technicians are expected to be good.

### State & Area Data (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-7>)

Explore resources for employment and wages by state and area for heating, air conditioning, and refrigeration mechanics and installers.

### Similar Occupations (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-8>)

Compare the job duties, education, job growth, and pay of heating, air conditioning, and refrigeration mechanics and installers with similar occupations.

### More Information, Including Links to O\*NET (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm#tab-9>)

Learn more about heating, air conditioning, and refrigeration mechanics and installers by visiting additional resources, including O\*NET, a source on key characteristics of workers and occupations.

### **SUGGESTED CITATION:**

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Heating, Air Conditioning, and Refrigeration Mechanics and Installers, on the Internet at <https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm> (visited *March 04, 2020*).

TVCC has partnered with Career Coach ([https://tvcc.emsicc.com/?](https://tvcc.emsicc.com/?radius=&region=10%20Mile%20Radius%20from%20Athens%2C%20TX)

[radius=&region=10%20Mile%20Radius%20from%20Athens%2C%20TX](https://tvcc.emsicc.com/?radius=&region=10%20Mile%20Radius%20from%20Athens%2C%20TX)) for students to discover majors and in-demand careers and education based on your interests!

- Career Assessment Profiler
- Interactive Career Catalog
- Browse TVCC's Pathways

Some careers in this field will require a bachelor's degree.

- TVCC's AA degrees are fully transferable to public universities in Texas. See an academic advisor or TVCC's university transfer webpage (<https://www.tvcc.edu/Advisement/Category.aspx?z=72>) for more information on this transfer opportunity.
- Many of TVCC's AAS degrees lead to an online Bachelor of Applied Arts and Sciences (BAAS) degree with participating universities. See an academic advisor or the BAAS transfer website (<https://www.ntxccc.org/pathways/>) for more information on this transfer opportunity.