

HVAC INSTALLATION & RESIDENTIAL SERVICE (HEAT), AAS

At Dunwoody College of Technology, the HVAC Installation & Residential Service program provides graduates with the entry-level skills and theoretical knowledge needed to install and maintain the safe operation and energy efficiency of residential and light commercial heating, ventilation, and air conditioning systems.

Graduates typically secure jobs as residential, commercial or industrial installers, shop workers, erectors, and service technicians working for existing and new construction HVAC companies. Students learn blueprint reading, load calculations, warm air systems design, mechanical and fuel gas code knowledge, installation techniques, pattern development, and fabrication skills.

Students also learn how to service – troubleshoot and repair – residential and light commercial HVAC systems.

In addition to field-related skills, students gain oral and written communication skills, advanced computation skills, customer relations, and critical thinking skills through Arts & Sciences and technical course work. A shorter certificate option is also available.

Credential Earned: AAS

Length of Program: 2 years (4 semesters)

Classes Offered: Day

Available Starts: Fall Semester; Spring Semester

Accreditation: HVAC Excellence

Bachelor's Completion Option(s): Construction Management (CMGT), Bachelor of Science (<https://catalog.dunwoody.edu/catalog-student-handbook/academic-programs/construction-sciences-building-technology/construction-management-cmgt-bachelor-science/>) | Business Management Leadership (AMGT), Bachelor of Science (<https://catalog.dunwoody.edu/catalog-student-handbook/academic-programs/construction-sciences-building-technology/construction-management-cmgt-bachelor-science/>)

Program Outcomes

- Select HVAC equipment for a designated application.
- Assess HVAC electrical circuits for proper operation.
- Assess HVAC mechanical equipment for proper operation.
- Analyze HVAC air and refrigerant systems for proper operation.
- Fabricate industry's most commonly used fittings.
- Generate HVAC systems on residential and commercial working plans.
- Install industry's most commonly used equipment.
- Apply effective safety practices while installing HVAC equipment.
- Complete installation of HVAC equipment according to national, state, and local codes.
- Demonstrate effective customer relation skills.

Degree Requirements

Code	Title	Credits
General Requirements		
MATH1010	Algebra I	3

Communications	3	
Humanities	3	
Social Sciences	3	
General Electives	3	
Technical Requirements		
SERV1110	HVAC Electrical I	2
SERV1120	Heating Systems I	3
SERV1130	Residential Controls I	2
SERV1140	Basic Motor Technology	3
SERV1150	Cooling Systems I	3
SERV1210	Heating Systems II	3
SERV1220	Cooling Systems II	3
SERV1230	HVAC Electrical II	2
SERV1240	Heating Systems III	2
SERV1250	Cooling Systems III	3
HEAT1110	HVAC Ducts & Fittings	2
HEAT1120	Transitional Fittings	3
HEAT1130	HVAC Trunk-line Construction	2
HEAT1140	Fundamentals of Pattern Development	3
HEAT1150	Advanced Pattern Development	3
HEAT2210	Welding Fundamentals	3
HEAT2220	HVAC Design	2
HEAT2230	Residential HVAC Installation	6
HEAT2240	Commercial Blueprint Reading	2
Total Credits	67	

Courses

Descriptions

SERV1110 | HVAC Electrical I | Lecture/Laboratory (2 Credits)

Basic electrical terminology and theory. Introduction to simple circuit construction. Basic electrical properties and their effects on circuits. Load capacity for wiring and fuses. Simple circuit diagramming. Theory of electrical generation through magnetism and electromagnetism. Analyzing and testing circuits with various test equipment.

SERV1120 | Heating Systems I | Lecture/Laboratory (3 Credits)

Basic fundamentals and terminology pertaining to heat transfer. Thermal environmental science properties. Latent and sensible heat, conduction, convection and radiation. Fundamental psychrometrics. Air distribution, room air movement characteristics and the fundamentals of balancing air systems. Analyzing static, velocity and total pressure along with airflow measurements within ductwork.

SERV1130 | Residential Controls I | Lecture/Laboratory (2 Credits)

Introduction to basic environmental controls with an emphasis on theory, application, and practical installation. Principles of Effective Temperature will be applied to various temperature, humidity, and air movement controls. Basic control of secondary circuits including transformers, relays, and contactors used in the operation of heating and cooling equipment. Sketch, diagram, and wire basic secondary control circuits. Job safety.

Prerequisite(s): SERV1110

SERV1140 | Basic Motor Technology | Lecture/Laboratory (3 Credits)

Theory of magnetism and circuitry as it pertains to the induction motor. Introduction to fundamental types of motors used in the HVAC field. Wiring of various power and control circuits. Introduction to the relay, contactor and motor starter. Motor usage and service problems encountered in the field. Electrical diagramming and schematics. Troubleshooting motor circuits. Motor nomenclature and safety.

Prerequisite(s): SERV1110

SERV1150 | Cooling Systems I | Lecture/Laboratory (3 Credits)

Basic fundamentals of cooling as it pertains to HVAC&R systems. Gas laws and the principles of the basic refrigeration cycle. Skills pertaining to refrigeration: tubing handling, flaring, swedging, soft and hard soldering and brazing. Introduction to refrigerants and refrigerant management.

Prerequisite(s): SERV1120

SERV1210 | Heating Systems II | Lecture/Laboratory (3 Credits)

Heat generation as it pertains to residential furnaces. Natural and LP gases. Furnace types, sequence of operation, component identification, ignition types, test equipment and safety. Troubleshooting pertaining to the mechanical operation and the electrical control functions of gas furnaces. Diagnostic skills to meet service problems encountered in the field. Combustion testing and job safety.

Prerequisite(s): SERV1110, SERV1130, And SERV1140

SERV1220 | Cooling Systems II | Lecture/Laboratory (3 Credits)

Fundamentals of residential air conditioning. Evacuation principles and procedures for deep vacuums. Basic split system air conditioning systems wiring and controls examined and diagrammed in schematics. Refrigerant chemistry examined. Refrigerant recycling, recovery, and management reviewed in accordance with EPA standards. Systematic refrigerant charging procedures determined and validated through hands-on guidance using actual equipment. Basic cooling analysis through psychrometrics and pressure-enthalpy processes. Job safety.

Prerequisite(s): SERV1110, SERV1130, SERV1140, And SERV1150

SERV1230 | HVAC Electrical II | Lecture/Laboratory (2 Credits)

Introduction to semiconductors and elementary solid-state circuits used in HVACR control circuits. Electrical schematics for HVACR secondary and load circuitry. Fundamental operation and wiring of motor starter secondary and load circuits examined, diagrammed, and wired. Electronic theory applied to electronic air cleaners, electronically commutated motors, and digital temperature controls. Continued application of relays, and contactors developed in lab jobs and servicing situations encountered in the field. EPA Section 608 Technician Certification test review and exam (required). Job safety.

Prerequisite(s): SERV1110

SERV1240 | Heating Systems III | Lecture/Laboratory (2 Credits)

Introduction to forced air, oil burning, and electric furnaces. Evaluation of gas, oil, and electric furnace sequences of operation coupled with combustion analysis. Practice of start up procedures and combustion testing processes. Mechanical and electrical applications using wiring diagrams and schematics. Diagnostic skills of mechanical, combustion, and electrical problems encountered in the field. Job safety.

Prerequisite(s): SERV1110, SERV1120, SERV1130, SERV1140, SERV1210, And SERV1230

SERV1250 | Cooling Systems III | Lecture/Laboratory (3 Credits)

Advanced residential air conditioning and air-to-air heat pump systems. Theory and troubleshooting of heat pumps. Application and operation of air conditioning and heat pump controls examined. Wiring diagrams and schematics examined and evaluated. Hydrocarbon Refrigerants certification test review and exam (required). Introduction to customer relations skills with a focus on occupational professionalism. Job safety.

Prerequisite(s): SERV1110, SERV1120, SERV1130, SERV1140, SERV1220, And SERV1230

HEAT1110 | HVAC Ducts & Fittings | Lecture/Laboratory (2 Credits)

Development and fabrication of ducts and fittings common to the heating, ventilation, and air conditioning industry, with emphasis on uniform and state code requirements. Methods of connecting ducts and fittings in an air system. Principles of geometric pattern development as it applies to duct construction and application. Multiple uses and care of hand tools common to the industry.

HEAT1120 | Transitional Fittings | Lecture/Laboratory (3 Credits)

Focus on transitional fittings where the triangulation method of pattern development is required. Use of direct triangulation, as a short-cut method of layout, is emphasized. Identification, care, adjustment, and maintenance of floor equipment common to the sheet metal industry.

Prerequisite(s): HEAT1110

HEAT1130 | HVAC Trunk-line Construction | Lecture/Laboratory (2 Credits)

Pattern development, and the fabrication of a scaled-down trunk-line, emphasizing the quality and quantity of work. Usage, construction methods, and installation of various types of dampers.

Prerequisite(s): HEAT1110 And HEAT1120

HEAT1140 | Fundamentals of Pattern Development | Lecture/Laboratory (3 Credits)

Principles of pattern development as they apply to the layout of round fittings requiring parallel, or radial line methods of pattern development. Fabrication procedures for round fittings, including use of rotary machines for fabricating purposes, riveting, and spot welding. Use, safety, and proper procedures for soldering sheet metal are incorporated.

Prerequisite(s): HEAT1110, HEAT1120, And HEAT1130

HEAT1150 | Advanced Pattern Development | Lecture/Laboratory (3 Credits)

Advanced theory and application of single, and double-line triangulation in the development of irregular patterns. Use of plan and elevation views in the visualization, and development of irregular objects as well as the procedure for the development of true-length lines seen in the foreshortened mode.

Prerequisite(s): HEAT1110, HEAT1120, HEAT1130, And HEAT1140

HEAT2210 | Welding Fundamentals | Lecture/Laboratory (3 Credits)

Applications, safety, and procedures for oxyacetylene, stick, GMAW, and TIG welding. Light and heavy-metal welding in flat position, freehand-cutting procedures, types of weld joints, and joint preparation. Vulcan software for CNC plasma table controllers.

HEAT2220 | HVAC Design | Lecture/Laboratory (2 Credits)

Heat loss and heat gain energy calculation based upon Manual J: Calculation. Development of the requirements for selecting and designing heating and cooling systems for residential construction. Operating characteristics, proper application, cost, advantages/disadvantages, and specific requirements for designing systems to meet specific needs.

HEAT2230 | Residential HVAC Installation | Lecture/Laboratory (6 Credits)

Installation procedures of residential and small commercial heating, ventilation, and air conditioning systems. Emphasis on the Uniform Mechanical code, and Minnesota State Mechanical, Fuel Gas, and Plumbing code, pertaining to heating, ventilation, and air conditioning installation procedures. Air-handling ducts, venting, combustion and fresh-air ducts requirements. Use of available standard-type fittings; sizing, cutting, and threading of gas pipe as well as installation and code requirement of residential-style gas systems. Installation, setup, and maintenance, of industries most common indoor air quality accessories is included.

Prerequisite(s): HEAT2210, HEAT2220, HEAT1110, HEAT1120, HEAT1130, HEAT1140, And HEAT1150

HEAT2240 | Commercial Blueprint Reading | Lecture/Laboratory (2 Credits)

Architectural, structural, civil, electrical and mechanical blueprint reading with a major emphasis on heating, ventilation, and air conditioning systems contained within these plans. Duct construction, hangers and dampers evaluated according to specification and SMACNA requirements. Make drawings using AutoCAD: 2-D drafting commands for HVAC drafting.

MATH1010 | Algebra I | Lecture (3 Credits)

Foundational algebra is applied the in the context of geometry and trigonometry. Topics include rules of exponents, simplifying expressions, solving equations, computing measurements of two and three dimensional shapes, solving right triangles, and solving oblique triangles.

General Education: Mathematics