

Heating/Air Conditioning Systems Design

The Career

Greater reliance on new and alternate energy sources and efforts to conserve natural resources while improving energy efficiency makes graduates of Dunwoody's Heating/Air Conditioning Systems Design program more valuable than ever. Students use mechanical engineering principles to produce working drawings of HVAC (heating, ventilating and air conditioning) residential and commercial systems, as well as plumbing and fire protection systems for large-scale commercial buildings. Most positions are with engineering firms, residential and commercial contracting firms or sales office environments. As designers they may collaborate with engineers in systems design, applications, testing and development work. Those who work with mechanical contractors perform design, equipment selection, layouts, estimating, and the supervision of systems installation. Sales positions involve applications, estimating, equipment demonstrations and testing.

Average starting salary: \$42,848

Source: This information is based on the 2007 Dunwoody Employment Report

The Program

There will always be a high demand for individuals that can design energy efficient heating and air conditioning systems for new and existing buildings. This program provides students with mechanical engineering skills and theoretical knowledge to design comfortable, safe and efficient indoor environments. Students calculate, design, and generate construction-drawings and supporting documents for residential and commercial heating, ventilating and air conditioning systems. In addition to field-related skills, students gain oral and written communication skills, computer literacy, advanced computational skills and critical thinking skills through Arts and Sciences and technical course work.

Program Length

Graduates of this six-quarter program earn an Associate of Applied Science (A.A.S.) degree, depending on Arts and Sciences courses completed. Students with previous training or experience in the occupation may arrange to take selected courses in the program.

Applying to Dunwoody is easy

To apply online, visit dunwoody.edu. Or, to speak with a Dunwoody Admissions representative, call 612-374-5800 or 800-292-4652.

Accredited by HVAC Excellence

Dunwoody College was the first Minnesota technical college to have its HVAC programs accredited by HVAC Excellence, the largest provider of certification in the HVACR industry. Certification ensures that Dunwoody programs meet or exceed industry standards for quality technical education.



A.A.S. Degree Requirements

HVAC111	Thermal Environmental Science
HVAC112	Thermal Environmental Science Lab
HVAC113	Warm Air-Load Calculations
HVAC114	Warm Air-Load Calculations Lab
HVAC115	Principles of Mechanical Design
HVAC116	Principles of Mechanical Design Lab
HVAC120	Fundamentals of Refrigerating & Air Conditioning Lab
HVAC123	Fundamentals of Refrigerating & Air Conditioning Service
HVAC125	Flow Technology
HVAC126	Flow Technology Lab
HVAC130	Basic Hydronic Systems Design
HVAC132	HVAC Systems Servicing Lab
HVAC133	HVAC Systems Servicing
HVAC136	Air Systems Mechanical Design
HVAC137	Air Systems Mechanical Design Lab
HVAC141	HVAC Fabrication and Installation
HVAC142	HVAC Fabrication and Installation Lab
HVAC200	HVAC Control Systems
HVAC201	HVAC Control Systems Lab
HVAC213	Air Conditioning Design-Heat Gain Calculations
HVAC214	Air Conditioning Design-Heat Gain Calculations Lab
HVAC215	Piping Systems Mechanical Design
HVAC216	Piping Systems Mechanical Design Lab
HVAC225	Unitary Systems Design
HVAC226	Unitary Systems Design Lab
HVAC231	Variable Air Volume Systems Design
HVAC232	Variable Air Volume Systems Design Lab
HVAC233	HVAC System Integration
HVAC234	Advance HVAC&R Equipment Sizing & Control
HVAC235	Advance HVAC&R Equipment Sizing & Control Lab
COMM100	Communication Theory & Practice
COMM101	Electronic Communications
ENGL101	Composition
MATH105	Algebra, Trigonometry and Geometry
RSCH100	Research Strategies
	Diversity Electives
	Science Electives
	Social/Behavioral Science Electives
	Arts/Humanities Electives
	General Electives



818 Dunwoody Boulevard
Minneapolis, MN 55403
612-374-5800 • 800-292-4625
dunwoody.edu

Heating/Air Conditioning Systems Design

Course Descriptions

HVAC111 - Thermal Environmental Science

Principles of physics used in air conditioning; laws of thermodynamics with major emphasis on environmental control; theory of testing, adjusting and balancing HVAC systems to specific thermal loads.

HVAC112 - Thermal Environmental Science Lab

Practical laboratory application of physics principles to air-conditioning processes; testing, adjusting and balancing of energy systems to specific thermal loads.

HVAC113 - Warm Air-Load Calculations

Step-by-step procedure for ASHRAE-based energy calculations including bin methods, load profiles, equipment modeling, performance and control modeling to ensure maximum energy efficiencies. Thermal performances of exterior envelopes with varying parameters including above- and below-grade earth-bermed, earth-sheltered and on-grade constructions.

HVAC114 - Warm Air-Load Calculations Lab

Practical application of ASHRAE-based energy calculations of various constructions; related computer programs including load estimating, operating cost analysis and equipment selection.

HVAC115 - Principles of Mechanical Design

Fundamental theory of the design and layout of residential and light-commercial HVAC systems. Sketching of working mechanical drawings; theory and application of friction and dynamic losses within energy systems.

HVAC116 - Principles of Mechanical Design Lab

Analysis of friction and dynamic losses within HVAC systems utilizing ASHRAE fitting loss coefficients. Duct-sizing methods. Making drawings using AutoCAD: 2-D drafting commands, precise geometry, optimal system use and complete use of AutoCAD for HVAC production drafting.

HVAC120 - Fund. of Refrig & Air Cond Lab

Servicing mechanical refrigeration equipment; basic electrical troubleshooting, system analysis and servicing of each component of the system in conjunction with the rest of the system; basic systematic servicing techniques.

HVAC123 - Fund. of Refrig & Air Cond Service

Introduction to the mechanical refrigeration cycle and associated equipment; the cyclic nature of the refrigeration system emphasizing individual components, basic electricity and the total system; correlation of theory with service practice.

HVAC125 - Flow Technology

Theory, operation and construction of piping systems. Pumps, pipes and control devices; formulation of pressure losses within systems; selection of pipe sizes to meet desired flow rates and available or allowable pressure drops using the more common engineering design flow loss calculations.

HVAC126 - Flow Technology Lab

Constructing, operating and analyzing piping systems; analyzing pressure losses within systems; sizing pipes against desired and allowable losses.

HVAC130 - Basic Hydronic Systems Design

Principles of design and layout of residential and light-commercial hydronic systems with emphasis on hydronic equipment, location and selection. Coordination of hydronic systems with architectural, structural, electrical and civil disciplines. Zone control and wiring are also discussed.

HVAC132 - HVAC Systems Servicing Lab

Servicing of simple domestic units up to and including complex commercial/industrial HVAC units; mechanical and electrical troubleshooting with laboratory hands-on training for air conditioners, heat pumps, oil-fired, gas-fired and electric furnaces.

HVAC133 - HVAC Systems Servicing

Operation of various types of HVAC equipment ranging from simple domestic to complex commercial/industrial units; mechanical and electrical troubleshooting techniques for air conditioners, heat pumps, oil-fired, gas-fired and electric furnaces.

HVAC136 - Air Systems Mechanical Design

Principles of design and layout of residential and light-commercial HVAC systems with emphasis on HVAC equipment location and selection, coordination of HVAC systems with architectural, structural, electrical and civil disciplines. Overview of aesthetics, architectural barriers, structural requirements, illumination, signal and transportation equipment.

HVAC137 - Air Systems Mechanical Design Lab

Design and layout of residential and light-commercial HVAC systems with emphasis on HVAC equipment location and selection; preparation of working mechanical drawings; coordination of mechanical, architectural, structural, electrical and civil disciplines.

HVAC141 - HVAC Fabrication and Installation

Layout of ductwork and fittings common to the HVAC industry; scaled-down trunk-line design; proper installation techniques of furnaces, diffusers, dampers, flex connectors, grilles, plenums and ducts.

HVAC142 - HVAC Fabrication and Installation Lab

Fabrication of ductwork and fittings common to the HVAC industry; scaled-down trunk-line fabrication emphasizing quality and quantity of work; proper installation of furnaces, diffusers, dampers, flex connectors, grilles, plenums and ducts.

HVAC200 - HVAC Control Systems

Pneumatic, electric and electronic HVAC controls used in commercial piping systems; analysis of various controlling modes with emphasis on definition of parameters to be controlled and best possible controlling systems.

HVAC201 - HVAC Control Systems Lab

Implementation of various pneumatic, electric and electronic HVAC controls used in commercial piping systems; control sequences analyzed and validated in commercial piping systems.

HVAC213 - Air Cond Design-Heat Gain Calculations

Procedure for calculating space design cooling loads using the ASHRAE or ACCA method; individual load sources, including roofs, walls, glass (conduction and solar), partitions, lights, people, appliances, power and infiltration.

HVAC214 - Air Cond Design-Heat Gain Calc Lab

Implementation of heat gain procedures for calculating space design cooling loads for a commercial building using the ASHRAE or ACCA method; individual load sources, including roofs, walls, glass (conduction and solar), partitions, lights, people, appliances, power and infiltration.

HVAC215 - Piping Systems Mechanical Design

Principles of design, layout and energy analysis of commercial piping systems in conjunction with local and state codes; coordination of plumbing, hydronics and steam systems with HVAC, architectural, structural, electrical and civil disciplines.

HVAC216 - Piping Systems Mechanical Design Lab

Designing and laying out energy efficient commercial plumbing, hydronics and steam systems in conjunction with local and state codes; preparing working mechanical drawings; coordinating with mechanical, architectural, electrical and civil disciplines.

HVAC225 - Unitary Systems Design

Developing requirements for selection and design of various packaged (unitary) heating and cooling equipment and life safety systems for commercial buildings; operating characteristics of unitary HVAC and fire sprinkling systems; proper application, costs, advantages and disadvantages, and specific requirements to design for energy efficiency.

Heating/Air Conditioning Systems Design

HVAC226 - Unitary Systems Design Lab

Preparing designs using working drawings of energy efficient unitary HVAC, and life safety/fire sprinkling systems of commercial buildings; preparing detailed construction documents depicting integration of all disciplines; smoke management for safe evacuation and fire suppression systems.

HVAC231 - Variable Air Volume Systems Design

Construction document development of various split-system HVAC and piping systems for commercial buildings; operating characteristics of large split-system HVAC and piping systems including variable air volume systems, proper application, costs, advantages/disadvantages, and designing to save energy.

HVAC232 - Variable Air Volume Systems Design Lab

Preparation of working construction documents of large split-system HVAC, piping and variable air volume systems for commercial buildings; preparing detailed drawings depicting integration of architectural, structural, electrical and mechanical components; layout of variable air volume and water-cooled condensing systems.

HVAC233 - HVAC System Integration

Analysis of building energy usage related to HVAC systems using integrated design methods; coordination of HVAC and piping systems with architectural, civil, structural and electrical disciplines; process of selecting HVAC, variable volume and hydronic systems to meet specific building requirements; defining building concerns and problems; listing all possible alternatives and selecting the best possible alternative as the final solution.

HVAC234 - Adv HVAC&R Equipment Sizing & Control

Procedures for complex psychrometric analysis of various building/equipment loads; correlation of the psychrometric process and equipment controlling process; heating, heating and ventilating, cooling, cooling and ventilating, and heating, cooling and ventilating modes.

HVAC235 - Adv HVAC&R Equip. Sizing & Control Lab

Hands-on psychrometric analysis of various building and equipment loads; selection of control systems to meet specific building needs validating with ASHRAE and Trane psychrometric charts.