# HEATING, VENTILATION, AIR CONDITIONING, & REFRIGERATION (HVAC-R) TECHNICIAN

## Associate in Applied Science (AAS)
## Program Code: 10-601-1
## Total Credits: 61

Mid-State's HVAC-R program students learn to install, maintain, and repair HVAC and refrigeration systems in residential, commercial, and industrial settings. This includes the ability to diagnose system issues, identify faulty components, and apply effective repair solutions as well as calibrate and optimize HVAC systems for energy efficiency, airflow, and performance. Students will also understand and work safely with electrical wiring, circuits, and control systems that power HVAC units and gain expertise in handling refrigerants, including EPA-certified safe disposal and adherence to environmental regulations. The program includes hands-on work to help students gain proficiency with industry-standard tools such as gauges, vacuum pumps, and multimeters. Students also participate in practical training to simulate real-world scenarios, including system installation, repairs, and inspections.

To learn more about this program, visit **mstc.edu/programs**.

### ACADEMIC ADVISOR

To schedule an appointment with an academic advisor, call 715-422-5300. Academic advisors will travel to other campuses as necessary to accommodate student needs. For more information about advising, visit **mstc.edu/advising.**

### NEW STUDENT CHECKLIST

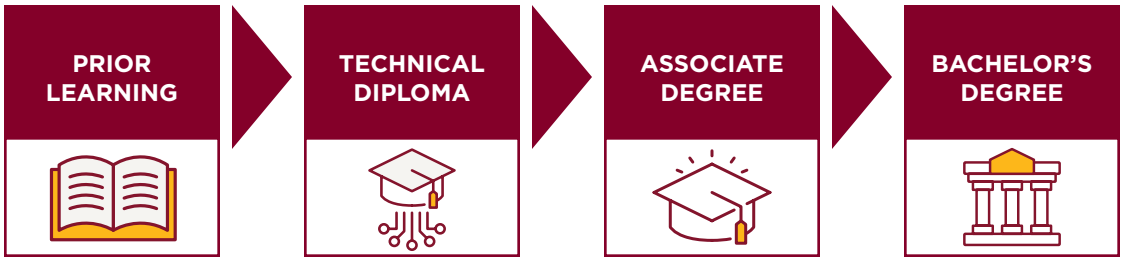
Complete the following steps to prepare for your New Student Advising appointment with your academic advisor:

- Submit a Mid-State application at **mstc.edu/apply**.
- Send official transcripts to:
  Mid-State Technical College
  Student Services
  500 32nd Street North
  Wisconsin Rapids, WI 54494
- Complete the Free Application for Federal Student Aid (FAFSA) at **fafsa.gov**. Mid-State's Financial Aid team is available to assist with your FAFSA application and to answer your financial aid questions. Contact Financial Aid or schedule an appointment at **mstc.edu/financial-aid**.
- Set up student MyCampus account at **mstc.edu/mycampus-assistance**.
- Schedule a New Student Advising appointment at **mstc.edu/advising**.



Mid-State does not discriminate on the basis of race, color, national origin, sex, disability, or age in its program, activity, or employment. The following person has been designated to handle inquiries regarding the nondiscrimination policies: Vice President – Human Resources; 500 32nd Street North, Wisconsin Rapids, WI 54494; 715-422-5325 • AAEO@mstc.edu. 3/2026-AC

# CAREER PATHWAY




**Career pathways help you build your education step by step. Each stage offers one or more credentials that are recognized by employers and lead to real jobs—and you can keep building toward your career goals as you go.**

**Begin at any point.**

## Prior Learning

**Credit for Prior Learning**

- Certifications and Licenses
- Military Experience
- National/Standardized Exams
- Transfer Credit
- Work and Life Experience

Learn about Credit for Prior Learning at **mstc.edu/cpl**.

**High School Credit**

- High School Dual Credit
- Mid-State Fast Track

Learn about High School Credit at **mstc.edu/dc**.

## Technical Diploma

- Construction Trades (11 Credits)
  Start Your Career: Electrical Contracting Laborer, Carpentry Contracting Laborer, General Construction Laborer, Plumbing Contracting Laborer
- Heating, Ventilation, & Air Conditioning (HVAC) Installer (25 Credits)
  Start Your Career: Heating, Ventilation, and Air Conditioning Installer, Heating, Ventilation, and Air Conditioning Sales Representative, Residential Heating, Ventilation, and Air Conditioning Technician

## Associate Degree

- Heating, Ventilation, Air Conditioning, & Refrigeration (HVAC-R) Technician (61 Credits)
  Start Your Career: Controls Technician, Installation and Service Technician, Refrigeration Technician, Steamfitter

## Bachelor's Degree

For those interested in continuing their education, Mid-State offers transfer guides with various four-year colleges and universities. For more information, visit **mstc.edu/transfer**.

## Other Options

Apprenticeship Opportunities: Carpenter, Construction Electrician (ABC), Construction Electrician (IBEW-NECA), Plumber, Steamfitter and Steamfitter Service

## OUTCOMES

Employers will expect you, as a Heating, Ventilation, Air Conditioning, & Refrigeration (HVAC-R) Technician graduate, to be able to:

- Install HVAC-R components.
- Service HVAC-R systems.
- Troubleshoot HVAC-R systems.
- Evaluate HVAC-R system designs.

## TECHNICAL SKILLS ATTAINMENT

The Wisconsin Technical College System (WTCS) has implemented a requirement that all technical colleges measure outcomes attained by students. This requirement is called Technical Skills Attainment (TSA). The main objective of TSA is to ensure graduates have the technical skills needed by employers. Faculty will let students know when and how the TSA is being assessed in the program.

## STUDENT HANDBOOK

Visit **mstc.edu/studenthandbook** to view Mid-State's student handbook, which contains information about admissions, enrollment, appeals processes, services for people with disabilities, financial aid, graduation, privacy, Mid-State's Student Code of Conduct, and technology.

## GRADUATION REQUIREMENT

The GPS for Student Success course is required for all Mid-State program students and is recommended to be completed before obtaining 12 credits. Some students are exempt from this requirement. Please see your academic advisor for more information.

## ADDITIONAL COURSES AS NEEDED

The following courses may be recommended or required if the student does not achieve minimum placement scores.

**College Reading and Writing 1**
**10831104**
**3 credits**
Provides learners with opportunities to develop and expand reading and writing skills to prepare for college-level academic work. Students will employ critical reading strategies to improve comprehension, analysis, and retention of texts. Students will apply the writing process to produce well-developed, coherent, and unified written work.

**Pre-Algebra**
**10834109**
**3 credits**
Provides an introduction to algebra. Includes operations on real numbers, solving linear equations, percent and proportion, and an introduction to polynomials and statistics. Prepares students for elementary algebra and subsequent algebra-related courses.

## MULTIPLE MEASURES

Students can place into courses using high school GPA and completed classes. Placement can be determined in the following ways:

- **Multiple Measures Writing (MMW)**
  High school GPA of 2.6 & successful completion of 2.0 credits of high school writing courses with a "C" or better
- **Multiple Measures Reading (MMR)**
  High school GPA of 2.6 & successful completion of 2.0 credits of high school literature courses with a "C" or better
- **Multiple Measures Math 1 (MMM_1)**
  High school GPA of 2.6 & successful completion of 1.0 credit of high school math (Algebra 1 or equivalent) with a "C" or better
- **Multiple Measures Math 2 (MMM_2)**
  High school GPA of 2.6 & successful completion of 2.0 credits of high school math including Algebra 1 and Algebra 2 with a "C" or better
- **Multiple Measures Science 1 (MMS_1)**
  High school GPA of 2.6 & successful completion of 1.0 credit of high school lab science course with a "C" or better
- **Multiple Measures Science 2 (MMS_2)**
  High school GPA of 2.6 & successful completion of 1.0 credit of high school chemistry with a "C" or better

*Past high school and college transcripts are used in making course placement decisions.*

## SAMPLE FULL-TIME CURRICULUM OPTION

**Heating, Ventilation, Air Conditioning, & Refrigeration (HVAC-R) Technician • 61 Total Credits**

**Term 18 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10476171 | Safety for Construction Trades | Yes | 1 |
| 10482107 | Construction Fundamentals | No | 2 |
| 10483123 | Piping Installation | No | 2 |
| 10601130 | Blueprint Reading for Construction Trades | No | 2 |
| 10601140 | Electricity for the Construction Trades | No | 2 |
| 10601150 | Fundamentals of HVAC | No | 2 |
| 10804107 | College Mathematics | Yes | 3 |
| 31442320 | Welding Foundations 1 | No | 1 |
| 10601110 | HVAC Heating Fundamentals | No | 2 |
| 10890102 | GPS for Student Success | Yes | 1 |

**Term 13 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10482103 | Electrical Components & Control Circuits 1 | No | 2 |
| 10483113 | Hydronics | No | 3 |
| 10601121 | Intro to HVAC Installation | No | 2 |
| 10601123 | Foundations of Air Conditioning & Refrigeration | No | 3 |
| 10809103 | Think Critically and Creatively | Yes | 3 |

**Term 15 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10809198 | Introduction to Psychology | Yes | 3 |
| 10801195 | Written Communication | Yes | 3 |
| 10482113 | Electrical Components and Control Circuits 2 | No | 3 |
| 10601124 | Commercial Refrigeration | No | 3 |
| 10483115 | Energy Load Estimation and Modeling | No | 3 |

**Term 15 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10601125 | Sustainable Energies for HVAC-R | No | 3 |
| 10601126 | Commercial Building HVAC Systems | No | 3 |
| 10601127 | Mechanical Service & Troubleshooting | No | 3 |
| 10801196 | Oral/Interpersonal Communication | Yes | 3 |
| 10809172 | Introduction to Diversity Studies | Yes | 3 |

**Please Note**

- Credit for Prior Learning (CPL) options are available for some courses. You can visit **mstc.edu/cpl** or contact your academic advisor for details.
- This curriculum sequence is only for student planning. Actual student schedules will vary depending on course availability.
- Program completion time may vary based on student scheduling and course availability. For details, go to **mstc.edu/schedule**.
- Get the latest updates online at **mstc.edu**.

## SAMPLE PART-TIME CURRICULUM OPTION

**Heating, Ventilation, Air Conditioning, & Refrigeration (HVAC-R) Technician • 61 Total Credits**

**Term 9 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10483123 | Piping Installation | No | 2 |
| 10601140 | Electricity for the Construction Trades | No | 2 |
| 10601150 | Fundamentals of HVAC | No | 2 |
| 10601110 | HVAC Heating Fundamentals | No | 2 |
| 10890102 | GPS for Student Success | Yes | 1 |

**Term 9 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10482103 | Electrical Components & Control Circuits 1 | No | 2 |
| 10483113 | Hydronics | No | 3 |
| 10809103 | Think Critically and Creatively | Yes | 3 |
| 31442320 | Welding Foundations 1 | No | 1 |

**Term 8 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10476171 | Safety for Construction Trades | Yes | 1 |
| 10482107 | Construction Fundamentals | No | 2 |
| 10601130 | Blueprint Reading for Construction Trades | No | 2 |
| 10809172 | Introduction to Diversity Studies | Yes | 3 |

**Term 8 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10601121 | Intro to HVAC Installation | No | 2 |
| 10601123 | Foundations of Air Conditioning & Refrigeration | No | 3 |
| 10804107 | College Mathematics | Yes | 3 |

**Term 9 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10482113 | Electrical Components and Control Circuits 2 | No | 3 |
| 10601124 | Commercial Refrigeration | No | 3 |
| 10801196 | Oral/Interpersonal Communication | Yes | 3 |

**Term 9 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10483115 | Energy Load Estimation and Modeling | No | 3 |
| 10601126 | Commercial Building HVAC Systems | No | 3 |
| 10601127 | Mechanical Service & Troubleshooting | No | 3 |

**Term 9 Credits**

| Course Number | Course Name | CPL | Credits |
|---|---|---|---|
| 10601125 | Sustainable Energies for HVAC-R | No | 3 |
| 10801195 | Written Communication | Yes | 3 |
| 10809198 | Introduction to Psychology | Yes | 3 |

**Blueprint Reading for Construction Trades**
**10601130**
**2 credits**
Develops the ability to read blueprints for commercial and non-commercial structures. Emphasizes blueprints drawn by licensed architects, covering plumbing, electrical wiring, structural framing, millwork, interior and exterior details, and basic information.

**College Mathematics**
**10804107**
**3 credits**
This course is designed to review and develop fundamental concepts of mathematics in the areas of algebra, geometry, trigonometry, measurement and data. Algebra topics emphasize simplifying algebraic expressions, solving linear equations and inequalities with one variable, solving proportions and percent applications. Geometry and trigonometry topics include; finding areas and volumes of geometric figures, applying similar and congruent triangles, applying Pythagorean Theorem, and solving right triangles using trigonometric ratios. Measurement topics emphasize the application of measurement concepts and conversion techniques within and between U.S. customary and metric system to solve problems. Data topics emphasize data organization and summarization skills, including: frequency distributions, central tendency, relative position and measures of dispersion. Special emphasis is placed on problem solving, critical thinking and logical reasoning, making connections, and using calculators.
*Prerequisite: High School GPA of 2.6 and MMM_1 or Accuplacer Arithmetic of 250 and QAS 234 or ACT Math score of 17 or Pre-Algebra 10834109 with a "C" or better*

**Commercial Building HVAC Systems**
**10601126**
**3 credits**
This associate-level course provides comprehensive training in systems commonly used in commercial and industrial settings. Key systems studied include Commercial, Packaged Rooftop Units, Variable Refrigerant Flow (VRF), and Variable Air Volume (VAV) Systems, with a focus on their unique operating characteristics and maintenance procedures. Supplemental materials will provide additional knowledge in maintaining and troubleshooting commercial boilers, chilled water, and steam heat systems, ensuring a comprehensive understanding of HVAC heating and cooling components.
*Prerequisite: HVAC Heating Fundamentals 10601110 and Foundations of Air Conditioning 10601123*

**Commercial Refrigeration**
**10601124**
**3 credits**
This comprehensive course provides students with the essential knowledge and hands-on skills required for the installation, maintenance, and repair of commercial refrigeration systems. Designed for aspiring technicians, the course covers topics such as refrigeration principles, system components, electrical controls, troubleshooting, and safety protocols specific to commercial applications. Students will learn to work with a variety of refrigeration systems used in industry.
*Prerequisite: Fundamentals of HVAC 10601150 and Foundations of Air Conditioning 10601123*

**Construction Fundamentals**
**10482107**
**2 credits**
Studies the concepts associated with the theory, materials, and methods used in construction, including footings and foundations, walls, floors, roofs and roof materials, exterior finishes, interior walls, ceiling and floor finishes, insulation types, vapor and air infiltration, and sound protection. Students also become familiar with blueprint reading and examine all trades associated with construction, including, electrical, HVAC, and plumbing. Safe use of the appropriate tools for each trade is covered.

**Developmental Psychology**
**10809188**
**3 credits**
Studies human development throughout the lifespan and explores developmental theory and research with an emphasis on the interactive nature of the biological, cognitive, and psychosocial changes that affect the individual from conception to death. Application activities and critical thinking skills enable students to gain an increased knowledge and understanding of themselves and others.
*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

**Electrical Components & Control Circuits 1**
**10482103**
**2 credits**
Topics include a review of AC/DC electricity fundamentals and the physical laws that apply to electronic circuits. Direct current (DC) covers basic definitions of voltage, current, and resistance and analysis of series and parallel resistive circuits. Alternating current (AC) includes an introduction to AC generation, capacitors, inductors, and transformers and their applications in electronic circuits. Additional topics include control circuits, symbols, diagrams, protection devices, relays, thermostats, single-phase motors, control components, and troubleshooting ACR system wiring diagrams.
*Prerequisite: Electrical Circuits I 10605105 or Electricity for the Construction Trades 10601140*

**Electrical Components & Control Circuits 2**
**10482113**
**3 credits**
HVAC Electrical Components and Controls 2 is an advanced-level course designed for students who want to deepen their understanding of electrical systems and control mechanisms used in modern HVAC applications. This course builds on foundational electrical knowledge and focuses on advanced concepts related to automated control systems, motor applications, and troubleshooting techniques commonly used in HVAC systems.
*Pre-requisite: Electrical Components & Control Circuits 10482103*

**Electricity for Construction Trades**
**10601140**
**2 credits**
This course is an introduction to electrical theory and application for those in the construction and building trades. Content includes AC and DC circuits, schematics, Ohm's Law, multimeter use and circuit troubleshooting. This course will also provide an introduction to the contents of the National Electrical Code (NEC).

**Energy Load Estimation and Modeling**
**10483115**
**3 credits**
In this course students will develop the skills to do residential and light commercial energy load estimations. Students will calculate heating and cooling building loads and estimate energy consumption rates and quantities. The student will also estimate energy upgrades such as insulation, window improvements, etc., and calculating payback and fuel savings. The course covers a variety of computer programs available for analyzing buildings.

**Foundations of Air Conditioning & Refrigeration**
**10601123**
**3 credits**
Topics include air conditioning principles and terms, the refrigeration vapor and compression cycle, refrigerants and oils, and methods of conditioning air for comfort and health. Also covers the proper use of refrigeration gauges, dry bulb thermometers, hygrometers, and reading and interpretation of psychrometric charts and scales as well as EPA 608 refrigerant handling standards.

**Fundamentals of HVAC**
**10601150**
**2 credits**
Fundamentals of HVAC is an introductory course designed to provide an understanding of the core principles that govern heating, ventilation, and air conditioning systems. Students will explore essential topics such as heat, temperature, and pressure, the relationship between matter and energy, and the importance of general safety practices in the field. The course will also cover the proper use of tools, instrumentation, and equipment commonly used in the HVAC industry.

**HVAC Heating Fundamentals**
**10601110**
**2 credits**
Provides an introduction to how homes and buildings are heated. Topics include introduction to heat principles, temperature measurement, fuels and other sources of heat, combustion, basic heating systems, basic furnace design, boiler design and operation, venting of furnaces, chimney or exhaust gases, and system controls. (HVAC is a common industry reference to heating, ventilation, and air conditioning.)

**Hydronics**
**10483113**
**3 credits**
Students participate in the installation and design of a hydronic hot water and heat pump system. Topics include safety; system design and layout; component selection; mounting hydronic heat sources; installing distribution tubing; and installing heat emitters, air separator, circulation pumps, and other system components.
*Prerequisite: Piping Installation 10483123*

**Intro to HVAC Installation**
**10601121**
**2 credits**
Addresses residential and light commercial heating and cooling systems. Emphasizes the diversity of heating and cooling systems and how they operate. Students participate in the installation of a variety of HVAC systems and troubleshoot and service systems. (HVAC is a common industry reference to heating, ventilation, and air conditioning.)

**Introduction to Diversity Studies**
**10809172**
**3 credits**
This course introduces the study of diversity from a local to a global perspective using a holistic, interdisciplinary approach that encourages exploration and prepares students to work in a diverse environment. The course introduces basic diversity concepts, examines the impact of bias and power differentials among groups, explores the use of culturally responsive communication strategies, and compares forces that shape diversity in an international context.
*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

**Introduction to Psychology**
**10809198**
**3 credits**
This science of psychology course is a survey of multiple aspects of behavior and mental processes. It provides an overview of topics such as research methods, theoretical perspectives, learning, cognition, memory, motivation, emotions, personality, abnormal psychology, physiological factors, social influences, and development.
*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

**Mechanical Service & Troubleshooting**
**10601127**
**3 credits**
This course is designed to provide students with the essential skills needed to perform HVAC mechanical service and troubleshooting in commercial and industrial environments. The course covers typical operating conditions and troubleshooting techniques for a range of HVAC systems. Students will gain hands-on experience with pump and blower service and alignment. Rigging techniques essential for equipment handling and installation will also be covered. The course culminates with a service job shadow experience.

**Oral/Interpersonal Communication**
**10801196**
**3 credits**
Focuses on developing effective listening techniques and verbal and nonverbal communication skills through oral presentation, group activity, and other projects. The study of self, conflict, and cultural contexts will be explored, as well as their impact on communication.
*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English or College Reading and Writing with a C or better*

**Piping Installation**
**10483123**
**2 credits**
This course introduces students to the fundamentals of measuring, fitting, joining, and installing piping common to the plumbing and HVAC industries.

**Safety for Construction Trades**
**10476171**
**1 credit**
The Safety for Construction Trades course teaches construction related workers about their rights, employer responsibilities and how to identify, abate, avoid and prevent job related hazards. Students will familiarize themselves with the proper selection and use of personal protective equipment and safety requirements on a construction site for various activities. Course outcomes align with the training outcomes recommended by OSHA. Upon successful completion, students will receive an OSHA 10 Card.

**Sustainable Energies for HVAC-R**
**10601125**
**3 credits**
This associate-level course explores sustainable energy solutions in the HVAC/R industry, focusing on environmentally friendly alternatives to traditional energy sources. Students will gain an in-depth understanding of various renewable energy systems, including Geothermal, Photovoltaic Solar, and Wind Energy, and how they can be integrated into HVAC/R systems for enhanced efficiency and sustainability. The course also covers the operation and maintenance of Solar Thermal Systems, and the use of Wood Fired, Pellet Fired, and Biomass Boilers for heating applications.

**Think Critically & Creatively**
**10809103**
**3 credits**
Provides instruction about critical and creative thinking that is in high demand in all occupations. Models, theories, and processes provide the foundation for learning logical thinking strategies. Students will apply a systematic approach to problem solving by analyzing the problem, assessing possible solutions, and making effective decisions. In addition, students will generate ideas and analyze complex issues. This course assists students with developing a critical thinking mindset which is essential at every level of personal and professional life.
*Prerequisite: High School GPA of 2.6 and MMR and MMW or Accuplacer Reading Skills of 236 and Writing of 237 or ACT of 15 Reading/16 English*

**Welding Foundations 1**
**31442320**
**1 credit**
An introduction to fundamental welding techniques with an emphasis on safe work habits that covers the processes of FCAW, GMAW, and OXY-Fuel cutting. Classroom instruction paired with lab activities are designed to provide fundamental skills in each of the welding processes covered in the class.

**Written Communication**
**10801195**
**3 credits**
Develops writing skills which include prewriting, drafting, revising, and editing. A variety of writing assignments are designed to help the learner analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Also develops critical reading and thinking skills through the analysis of a variety of written documents.
*Prerequisite: High School GPA of 2.6 and MMW or Accuplacer Writing of 262 or ACT English score of 20 or completion of College Reading and Writing 1 10831104 with a "C" or better*