

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

## MASTER PLAN OF INSTRUCTION 2026 - 2027

Rick Castro, Instructor  
Kristian Rivera Munoz, Instructor



### MISSION

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**Fort Myers Technical College**  
3800 Michigan Avenue  
Fort Myers, FL 33916  
(239) 334-4544



The Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) program is 1,350 hours of instruction training individuals to attain an entry-level position in the HVAC/R industry. The program covers a broad range of instruction that may be found in the program outline of this Master Plan of Instruction. An appropriate amount of time is spent in each area to thoroughly cover needed instructional material as well as to gain manipulative skills.

The program utilizes both theory and practical application of material to help the students gain needed knowledge and skills. Due to the increasing complexity of systems on today's HVAC/R equipment, it is even more important to know why a procedure is done as well as how it is done. Understanding how a system functions, therefore, has an important role to play in this program of study.

Each student must successfully complete written test material on theory and related topics as well as successfully demonstrate the practical application of this information in the laboratory environment.

Prerequisites for this program should include a background in the sciences such as chemistry and physics on a very basic level, math in general with an emphasis on basic geometry, algebra and measuring. Computer skills are essential for navigating the Internet, accessing computerized simulators, and interfacing with learning management systems.

### **PROGRAM MISSION**

The mission of the Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) program is to prepare students for employment in the HVAC mechanic or installer positions in the HVAC/R field. It is also designed to assist those students who wish to update present skills and cross-train in other HVAC/R areas. The program focuses on student and industry needs. Training is constantly updated by the instructor and program advisory committee to keep current with technological changes.

### **PROGRAM STANDARDS**

- Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- Explain the importance of employability, soft skills, entrepreneurship skills and making career plans.
- Identify, use and maintain the tools and tool accessories used in the heating, air-conditioning and refrigeration industry.
- Demonstrate mathematics knowledge and skills.
- Explain the properties of matter and heat behavior.
- Describe the history and concepts of heating, air-conditioning and refrigeration.
- Analyze fluids, pressures, refrigerants and related codes.
- Evaluate heating, air-conditioning and refrigeration system components and accessories.
- Fabricate and service the piping, tubing and fittings used in the heating, air-conditioning & refrigeration industry.
- Utilize and operate mechanical refrigeration servicing and testing equipment.
- Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning and refrigeration equipment.
- Demonstrate knowledge of electrical wiring in air-conditioning and refrigeration.
- Troubleshoot heating, air-conditioning and refrigeration electrical control systems and their components.
- Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- Maintain, test and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- Utilize mechanical components of heating air-conditioning and refrigeration systems.
- Operate solid-state electronics as used in heating, air-conditioning and refrigeration systems.
- Read construction documents.
- Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- Use combustion-type heating servicing and testing equipment.
- Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.

- Understand the design of heating and cooling systems.
- Select appropriate commercial compressors.
- Test and adjust commercial evaporative condensers.
- Maintain, test and troubleshoot commercial evaporators.
- Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- Maintain, troubleshoot and repair commercial heating systems.
- Discuss new HVAC/R technologies.
- Interpret, use and modify construction drawings and specifications.
- Troubleshoot and repair commercial heating and air-conditioning systems.
- Develop an understanding of hydronic systems.
- Determine the properties of air.
- Use a pressure enthalpy chart to diagram refrigerant cycles.
- Explain the standards for and ways to measure indoor air quality.
- (Optional) Identify and understand pneumatic control systems for commercial heating and air-conditioning applications.
- Develop an understanding of chilled systems.
- (Optional) Maintain and repair thermal storage systems.
- Understand and explain the calculation of commercial heating and air-conditioning loads.
- Balance an air distribution system.
- Select energy conservation equipment.
- Analyze building management systems.
- (Optional) Recommend alternative heating and cooling systems for various case studies.
- Apply relevant technology to workplace scenarios to aid productivity.
- Interpret and express interpersonal communication.
- Interact with others to accomplish workplace goals.
- Manage personal behavior to maximize productivity and professional growth.
- Find, assess and apply to job opportunities.
- Communicate personal competence, character and fit for a job opportunity.
- Cultivate and leverage relationships to professionally advance.

## **ESSENTIAL TRAINING TASKS**

### **Physical Requirements**

Ability to:

- Maintain a high degree of manual dexterity
- Stoop
- Kneel
- Lift at least 50 pounds and walk with it
- Use voice, hearing, and sight effectively to perform jobs in the HVAC/R field
- Crouch or bend
- High degree of finger dexterity
- Crawl
- Differentiate colors
- Use depth perception
- Work in an atmosphere of loud noise
- Work in an atmosphere of changes in temperature
- Perform repetitive tasks
- Measure accurately
- Work without close, direct supervision
- Work on multiple tasks and priorities
- Perform and complete tasks of relative complexity

## **Cognitive Requirements**

Ability to:

- Handle confrontation and frustration and assist in problem resolution
- Interpret a variety of instructions furnished in written, oral, and diagrammatic form
- Collaborate with others
- Cope with high levels of stress
- Perform mathematical computations at a level of tenth grade or higher
- Make fast decisions under pressure
- Cope with anger, fear, and hostility of others in a calm manner
- Demonstrate a high degree of patience
- Read and understand computers and related equipment
- Work in close or crowded areas
- Communicate effectively with customers, fellow students, and instructional staff

## **ACCOMMODATIONS**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or post-secondary student's accommodations plan to meet individual needs to ensure equal access. Post-secondary students with disabilities must self-identify, present documentation, required accommodations if needed, and develop a plan with their post-secondary service provider. Accommodations received in post-secondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology, and special communication systems. Documentation of the accommodations requested and services provided are maintained in a confidential file.

## **TUITION**

Tuition is charged for adult students at a rate established by the Florida legislature; tuition is waived for eligible high school dual-enrolled students. Current tuition and fee information is available from Student Services and is due prior to the first day of each payment period. Failure to pay all fees due at the time class begins will result in the student not being able to attend class and/or clinical.

## **CLASS SCHEDULE**

Classes meet Monday through Friday from 8:00 A.M. until 2:30 P.M. Lunch breaks are 30 minutes in length. This amounts to 30 hours of classroom instruction per week.

## **ATTENDANCE POLICY**

In an effort to develop appropriate employability skills, FMTC students are expected to attend all class sessions. As is expected in the workplace, when it is necessary to be absent due to illness or emergency situations, all students are to notify the instructor on or before the date of the absence. The student attendance policy for each post-secondary program is consistent with industry standards.

Campus attendance is kept via a computerized system. It is the responsibility of the student to **log in and out** in order to receive credit for class time. This allows the school to keep accurate attendance records for the actual number of hours and minutes attended.

All students are expected to be in attendance at least 90% of their scheduled hours during each payment period. Students failing to maintain the 90% attendance standard may not be permitted to continue in their program and may be withdrawn.

### **Absences and Tardies**

A student who is absent for 6 consecutive class sessions, without prior approval and without contacting the instructor, will be withdrawn from enrollment in his/her program.

Students who are late for class, including returning late from lunch, must notify their instructor and clock in upon arrival. Students who leave school early must notify their instructor and clock out. This time out of class is recorded as time absent and is counted against the required 90% attendance.

Adult students who know they will be out of school for an extended period of time may apply for a Leave of Absence. Students who exercise a Leave of Absence may have to extend their time in their program and pay additional fees.

### **Leaving Campus During School Hours**

Students must notify their instructor when leaving campus early. This is for the safety of students, to accurately track time, and to allow the instructor to best utilize instructional resources. Students may leave campus for lunch provided they return in the time allotted.

## **PLAN OF INSTRUCTIONAL PRACTICES**

### **Teaching Methods**

HVAC/R theory is taught using a hybrid of face-to-face instruction and interaction with the text material and instructor as well as computerized delivery of text, audio-visual material, and assessments. Teaching aids utilizing digital presentations, DVDs, etc. are used largely throughout all instruction. Practical shop experiences are designed to enhance and reinforce the theories involved as well as to develop manipulative skill and good work and safety practices. Wall charts, specification charts, and other reference materials are on constant display throughout the classroom and laboratory.

A great deal of equipment must be utilized for "hands-on" skill requirements. Test equipment such as multi- meters, amp meters, gauges, recovery machines are used so that the students will acquire rapport in working with such equipment and will have a basis for future troubleshooting requirements. Materials are reviewed and updated periodically to keep them as current and as relevant as possible.

### **Safety**

A basic outline of safety standards and practices is covered at the beginning of class along with a continuous implementation of safety principles.

### **Evaluation**

Class performance, quizzes, tests, attendance, portfolio assessments, completion of project assignments, decision-making, work habits, achievement of entry-level competencies, and other methods are used for evaluation. See "Grading Policies."

### **Work-Based Activities**

Work-based learning activities play an integral part of the curriculum of FMTC's career-technical training programs. These activities are planned with two objectives in mind. First, the activity provides students with the opportunity to develop and apply 'real world' experience using the knowledge and skills attained in the program. Second, the activity provides the instructor with objective input from potential employers or customers of program graduates. Each work-based activity has a written instructional plan outlining objectives, experiences, competencies, and evaluation required during the activity.

Work-based activities are program specific and may include:

- Unpaid in-school shop activities to provide customer service opportunities under the direct supervision of the program instructor.
- Unpaid job shadowing experiences that may include in-school or off-campus employer-based experiences under the supervision of a qualified employer representative who is working closely with the program instructor.
- Paid or unpaid cooperative training experiences conducted at the employer's work location under the supervision of a qualified employer representative and under the direction of the program instructor.

### **Cooperative Education (Co-Op)**

Cooperative training is coordinated by the instructor and career specialist. Co-Op is for students who have shown competence in program training that indicates readiness for placement in an on-the-job program. To be eligible for a Co-Op experience, students must have completed at least 75% of the required program hours. Requirements may differ for those receiving VA Benefits. Veterans will be accepted into the program in accordance with the Department of Veterans Affairs' approved program.

Students may be returned to the program for additional training if they do not function satisfactorily on the job or when the cooperative agreement is terminated at the request of the student, parent, employer, or program instructor.

Additional information regarding cooperative training opportunities may be obtained from the program instructor or career specialist. The lack of a valid driver's license may be a barrier to obtaining a Co-Op placement.

### GRADING POLICIES

#### Grading Categories:

Assessments	20%
Career Application (shop)	20%
Employability Skills	60%

**Grading Scale:** Students must maintain a minimum of a 75% grade average to progress in the program (80% is health science programs). A record of the student's progress is kept by the instructor and available to the student in the FOCUS Student Portal. High school grades for dual enrolled students are reported to the assigned high school.

90 – 100	A
80 – 89	B
75 – 79	C
< 75	Failing

Each program has an employability skills rubric based on employee expectations in the industry.

### SATISFACTORY ACADEMIC PROGRESS

In order to receive and continue to receive financial assistance of any type, a student must maintain satisfactory academic progress. The Financial Aid department will require a progress report to be completed and submitted to the Financial Aid Office prior to each disbursement. Students are considered to be making Satisfactory Academic Progress (SAP) if they successfully complete their scheduled clock hours, achieve a specific cumulative grade average (CGA), and do not exceed the maximum time limits to complete their course of study. Each student's academic progress will be checked at 450 clock hours for students enrolled in programs one academic year or greater. Progress will be checked at the half-way point for programs less than one academic year. No SAP is required prior to the first disbursement.

### REQUIREMENTS FOR CERTIFICATE

Students meeting the following requirements are awarded a full program certificate:

- 1) Mastery of 85% of program competencies as determined by the instructor
- 2) A final grade of 75% or better (80% Health Sciences) in each course
- 3) Proof of state-mandated basic skills levels
- 4) Attendance of a minimum of 90% of scheduled hours each payment period (95% of scheduled hours for some Health Science programs). Under unique circumstances, instructors in our competency-based programs have the discretion to graduate students who fall short of 90% as long as #1-3 above are met.

### STUDENT DRESS CODE

**Required Uniform:** FMTC khaki uniform work shirt, work pants or jeans, work shoes or boots with leather uppers and non-conductive soles and heels (canvas uppers on shoes are not acceptable), and visible FMTC student ID badge.

### PROGRAM STRUCTURE

Below is a summary of the Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) program structure. For more detailed information for each course, visit the FLDOE Curriculum Framework website:

<https://www.fl DOE.org/academics/career-adult-edu/career-tech-edu/curriculum-frameworks/2026-27-frameworks/architecture-construction.stml>

#### **OCP A Introduction to HVAC/R**

A student completing this course could possibly find employment as an HVAC/R helper with introductory knowledge of electrical components and their function.

#### **OCP B HVAC/R Fundamentals**

A student completing this course could possibly find employment as an HVAC/R mechanic's assistant with introductory knowledge of system components and their function, refrigerants and their applications, and be EPA Certified for Proper Refrigerant Usage.

**OCP C                    HVAC/R Service Practices**

A student completing this course could possibly find employment as an HVAC/R Mechanic with introductory knowledge of system and piping design, start-up and shut-down procedures, and duct sizing.

**OCP D                    HVAC/R Intermediate Service Practices**

A student completing this course could possibly find employment as an HVAC/R Mechanic with advanced knowledge of system and piping design, start-up and shut-down procedures, and duct sizing.

**OCP E                    HVAC/R Advanced Service Practices**

A student completing this course should find employment as an HVAC/R entry-level maintenance technician, service technician, or commercial refrigeration service technician.

**TEXTBOOKS**

Required textbooks for the Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) program are ordered by the instructor.