



Lake Technical College

2019 - 2020

**Master Plan of Instruction  
Air Conditioning, Refrigeration &  
Heating Technology 1 & 2**

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The mission of Lake Technical College is to be an integral component of the economic growth and development in our community by offering a variety of high quality career-training opportunities.

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**LAKE TECHNICAL COLLEGE**  
**Air Conditioning, Refrigeration and Heating Technology 1 & 2**

**INTRODUCTION**

The Air Conditioning, Refrigeration, and Heating Technology 1 & 2 Programs are 750 and 600 hours respectively, responsible for training individuals to attain an entry-level status 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. 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 math and in general with an emphasis on **basic** geometry and measuring. These areas are taught as part of the program of study, but it would be helpful to have these skills in advance.

Materials used are self-paced which allow students to progress at their own pace under the supervision of the faculty. Competencies in each area are completed after both written and performance testing.

**PROGRAM MISSION**

The mission of the HVAC/R Technology Program is to prepare students for employment as a HVAC mechanic or installer 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 faculty and program advisory committee to keep current with technological changes.

**ADMISSION REQUIREMENTS**

Applicants must be at least 16 years of age and should be academically, physically, and emotionally capable of meeting the demands of the chosen program. Applicants make initial application through the Admissions Office. A minimum skills evaluation is part of the admission process. It is highly recommended that co-enrolled and dual-enrolled students meet with the program Faculty prior to entering the program.

The Florida Legislature requires that prospective students be evaluated to determine levels of reading, math, and language skills. This evaluation helps staff and students in determining the career fields in which each student can be successful. The admission requirements for the Air Conditioning, Refrigeration, and Heating Technology 1 and 2 programs include:

1. Complete an LTC online application
2. Take the basic skills examination, if required
3. Meet with a career advisor
4. Confer with the program faculty or department chairperson prior to actual enrollment

**TEST OF ADULT BASIC EDUCATION (TABE)**

All applicants for Career and Technical Education (CTE) programs 450 hours or more, with the exception of Florida Law Enforcement Academy applicants, take a state mandated basic skills examination prior to enrollment. Scores are good for two years and must be valid at the time of enrollment.

Assessment instruments meeting this requirement include (must be within 2 years of enrollment to be considered valid):

- A **common placement test** where a minimum score has been achieved pursuant to Rule 6A-10.0315, F.A.C.;
- Tests of Adult Basic Education (**TABE**) 11 & 12; and,
- 2014 GED® Tests: **Reasoning through Language Arts** and/or **Mathematics Reasoning** where a minimum score (145) as required in Rule 6A-6A.6.021, Florida Administrative Code (F.A.C.) has been achieved.

Applicants transferring appropriately leveled TABE, GED test sections, or common placement tests must do so by having an official score report sent directly to the Admissions Office prior to enrollment in the program. Scores brought by hand will be accepted only if document provided by the outside testing center is in a sealed envelope. **Standardized tests scores are valid for two years.**

Several exemptions to TABE are accepted. In order to be exempt, a student must submit official documentation to a career advisor for verification of an exemption:

- Applicants who possess a **documented degree** in applied science (AAS) level or higher;
- Applicants who earned a **Florida standard high school diploma, 2007 or later** (see withdrawal codes for standard);
- Applicants who are serving as an **active duty member** of any branch of the United States Armed Services;
- Documented passing scores on **state-designated industry certification** tests may be used;
- Any student enrolled in an **apprenticeship program** that is registered with FDOE in accordance with Chapter 446.

If a student has met or exceeded standard scores on one area of one test, they may use another test to meet the additional skill area requirements. It is acceptable to combine test scores from more than one test. (Rule 6A-10.315, F.A.C.)

Required TABE exit scores may be waived for documented special needs students as per Florida guidelines. The student must enroll in AAEE and begin remediation in order to meet the exit requirements of the CTE program in which the student is enrolled. A student, with a documented disability, who is approaching completion (**mastered 90% of the competencies**) of the CTE program and has not met TABE scores, may be considered for a TABE exemption.

According to Florida Department of Education rules, students who fail all or parts of the TABE may only retest using a different TABE version after 60 documented hours of remediation in the Applied Academics for Adult Education (AAEE) lab or three months if not attending AAEE. Students may not retake the same test version for six months. We, therefore, strongly recommend that students test early, especially for licensure programs, in order to allow time for remediation and retesting should the need arise.

Students who do not meet the minimum TABE scores set by the Florida Department of Education for their program must begin attending remediation classes in the AAEE lab prior to or at the time of enrollment in a Career and Technical Education class for at least one block a day and make acceptable progress as determined by the AAEE faculty. It is highly recommended students meet state mandated TABE requirements by the time they have completed 50% of their program. Students who do not meet state mandated TABE scores may not receive a certificate of completion as per Florida Department of Education rules.

Applicants transferring appropriately leveled TABE, PERT or other accepted standardized test scores from other testing centers must do so by having an official score report sent directly to the Admissions Office prior to enrollment in the program. Scores brought by hand will be accepted only if document provided by the outside testing center is in a sealed envelope. Standardized tests scores are valid for two years.

The required TABE exit scores for this program are: Reading 9; Math 10; and Language 9.

## ESSENTIAL TRAINING TASKS

### Physical Requirements

Ability to:

1. Maintain a high degree of manual dexterity
2. Stoop
3. Kneel
4. Lift at least 50 pounds and walk with it
5. Use voice, hearing, and sight effectively to perform jobs in the HVAC/R field
6. Crouch or bend
7. High degree of finger dexterity
8. Crawl
9. Differentiate colors
10. Handle and finger supplies
11. Use depth perception
12. Work in an atmosphere of loud noise
13. Work in an atmosphere of changes in temperature
14. Perform repetitive tasks
15. Measure accurately
16. Work without close, direct supervision
17. Work on multiple tasks and priorities
18. Perform and complete tasks of relative complexity

### Mental and Emotional Requirements

Ability to:

1. Handle confrontation and frustration and assist in problem resolution
2. Interpret a variety of instructions furnished in written, oral, and diagrammatic form

3. Work with others
4. Cope with high levels of stress
5. Perform mathematical computations at a level of tenth grade or higher
6. Make fast decisions under pressure
7. Cope with anger, fear, and hostility of others in a calm manner
8. Demonstrate a high degree of patience
9. Read and understand computer and related equipment
10. Work in close or crowded areas

## 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 postsecondary student's accommodations plan to meet individual needs to ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their postsecondary provider.

Students desiring accommodations or updates to their accommodations are encouraged to self-identify as early in the program as possible. In order to receive disability accommodations, students must self-disclose the disability to the Students with Disabilities Coordinator and provide documentation that clearly shows evidence of a disability and applicable accommodations. The Students with Disabilities Coordinator will schedule a meeting with the student and faculty to discuss the documented disability and applicable accommodations.

Accommodations received in postsecondary 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, assessments, time demands, schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodation requested and provided is maintained in a confidential file.

## TUITION

Tuition is charged for adult students at a rate established by the State legislature. Current fee information is available in the Admissions Office. Tuition is waived for eligible high school dual-enrolled students. Tuition is due prior to the first day of each semester based on the Lake Technical College payment calendar. Failure to pay all fees due at the time class begins will result in not being able to attend class and/or clinical if applicable.

## MATERIALS

Uniform shirts  
Safety goggles (no tinting)  
Textbooks

## CLASS SCHEDULE

Full-time students attend class from 7:45 AM to 3:45 PM Monday through Thursday with a 30 minute lunch period. This schedule provides 7.5 hours of instruction each day for a total of 30 hours per four-day week, excluding holidays and school breaks as outlined in the current school calendar.

## ATTENDANCE POLICY

In an effort to develop appropriate work ethics, LTC 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 faculty on or before the date of absence. The student attendance policy for each postsecondary 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. Faculty are not expected to manually enter student attendance. Only one override is permitted for failure to log in or out. Therefore, failure of a student to log in and out may result in a documented absence. Logging in or out for another student or having another student log in or out is unacceptable behavior and may result in dismissal.

Only regularly scheduled class hours will be reported for attendance. Practice exercises completed at home does not count toward hours in the program. Make-up time will not be accepted except as approved by the Executive Director of Lake Technical College.

### Absences

A student who is absent for six (6) consecutive class sessions will be withdrawn from enrollment in his/her program. A student withdrawn for absenteeism must petition administration to return. Students exhibiting a pattern of consecutive absences less than six days will be subject to dismissal as determined by a School Intervention Team. Students with attendance issues will sign an acknowledgement that they have been notified that continued absences will pose a threat

to grades and program enrollment. If the student's attendance does not improve but drops below 60%, the student will be withdrawn unless documentation regarding extenuating circumstances is provided to the Dean of Student Services.

Students in non-licensure programs must have achieved a minimum of 80% attendance at the end of each quarter. Students not having met this requirement will be formally notified that continued absences will pose a threat to grades and program enrollment. School Intervention Team meetings will be held as necessary to attempt to alleviate issues resulting in excessive absences and to counsel the student of possible alternatives and consequences. Students who miss more than 20% of their program will not be allowed to re-enroll the next semester and must wait until the following enrollment period to re-register unless the student's appeal to the Executive Director has been approved. Only regularly scheduled class hours will be reported for attendance.

### **Tardiness**

As in the workplace, students are expected to be in their seats promptly in the morning, after break, and after lunch. Students are expected to notify the faculty before the start of class of any anticipated tardies.

### **Leaving Campus during School Hours**

For safety reasons, students will notify their faculty when leaving campus early. Students may leave campus for lunch provided this is done within the allotted time.

## **PLAN OF INSTRUCTIONAL PRACTICES**

The Air Conditioning, Refrigeration and Heating Technology curriculum at Lake Technical College is designed as an open-entry, individualized, competency-based method of instruction. With this instruction method, a qualified student may enter the program at any time during the school year. The student proceeds through the prepared curriculum individually and at the student's own pace, within the limits set by the program faculty. The faculty follows the student's progress, making suggestions, as required, so the individual will gain the knowledge and experience in a minimum of time. The student must successfully complete all of the competency requirements of the program to receive a graduation certificate.

### **Teaching Methods**

With open-entry/open-exit, competency-based instruction, the students typically consists of individuals at various levels of progress through the curriculum. For this reason, a minimum of formal classroom instruction time is used in the learning process. Students proceed at their own pace with written, audio-visual, and hands-on training. They are tested periodically with written and practical testing.

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. Teaching aids utilizing digital presentations, DVDs, etc., are used to a great extent throughout all instruction. 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 multimeters, 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. Students are made responsible for all laboratory requirements such as maintaining tools, equipment, and facilities, writing repair orders, tool room management, and cleanup of shop areas.

### **Online Access**

Technology is an integral part of our daily lives. From smart phones to electronic tablets, these devices are becoming items that many cannot function without. In addition, the Internet is changing the way education is delivered. Lake Technical College strives to ensure that our students are able to compete in this technology driven world. With this in mind, it is recommended that students have an online presence and access to the internet.

It is also important that students have an email address that they check on a regular basis. A lot of information may come to you through your email, so it is important that you check it regularly. If you do not have an email address, there are numerous services that provide FREE email addresses. Please make sure your faculty have a current, working email address for you. See your faculty for more information.

## **Social Media**

The advent of social media has created a world-wide communication medium for persons of all ages. While extremely popular, these websites have also created their own set of “not-so-popular” problems such as cyber-stalking, identity theft, cyber-bullying, cyber-cheating (posting of exam, or other course material), and a host of other nebulous challenges that users may face. Another reality associated with social media is its far-reaching consequences for those who share posts that may be seen by others as inappropriate.

Potential employers, current employers, civic, or educational organizations you may be associated with, and many others are looking at social media sites for information that may tell them things about an individual. Students should also be cautioned on how private their social media content really is – despite the settings on an account. All social media sites are potentially vulnerable. A simple search of how to view pages that are set as “private” for a popular social media website yielded numerous responses for ways to view the content. Everything from blogs to online videos offer to explain how to accomplish this task.

Students in all programs need to be cognizant of the fact that most professions rely on great moral character. It is recommended that when using social media, assume that all posts will be seen/read by everyone with access to the internet.

## **Evaluation**

Oral and/or written tests during and at the end of each unit or competency are administered with checklists relating to projects and tasks.

The faculty observes and evaluates all shop projects. Whenever possible, criterion reference models and/or checklists are used to evaluate shop performance.

On a progress chart major skills (competencies) are listed for each student. As a competency is correctly mastered by the student, it is initialed by the faculty and graded.

## **Work Based Activities**

Work-based learning activities play an integral part of the curriculum of Lake Technical College’s (LTC) 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 a “real world” experience using the knowledge and skills attained in the program. Second, the activity provides the faculty 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/lab activities to provide customer service opportunities under the direct supervision of the program faculty.
- 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 faculty.
- 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 faculty.

## **Cooperative Education**

Cooperative training is available for students and coordinated by the program faculty. Students must be enrolled in their last course of their program in order to participate in Co-op. In addition, basic skills exit levels must be met and the student can have no outstanding debt with the school. Students must be approved for Co-op prior to beginning, including clearance through financial aid.

High school students participating in the cooperative job placement program must be in at least the 12th grade and have completed 50% of exit points A and B.

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

Veterans will be accepted into the program in accordance with the Veterans Administration approved program.

Additional information regarding co-op opportunities may be obtained from the program faculty.

## **Job Shadowing**

Job shadowing experiences, or volunteer experiences, are available to students who may benefit from the experience. These experiences are designed to give the student actual hands-on experience doing a variety of automotive related tasks. Length and type of experiences will vary. The program faculty determines appropriateness of the experience. Additional information regarding job-shadowing experiences may be obtained from the program faculty.

## **GRADING PROCEDURE**

### **Grading Scale**

The grading policy for this program is as follows:

- 90-100 Excellent
- 80- 89 Passing
- < 80 Failing

Lake Technical College is a postsecondary institution designed to provide trained individuals to industry. The grading scale for this program reflects industry standards. The approved postsecondary program grading requirements must be met if the student is to receive a certificate. An average grade of 80% is required to earn an occupational completion point or a certificate of completion.

Student grades are determined through the following percentages:

1. Skills (hands-on) 33 1/3 percent
2. Knowledge 33 1/3 percent
3. Professional Skills 33 1/3 percent

### **Skills - Student Performance Objectives**

One-third of the grade is based on hands-on skills, as determined by the student performance objectives. Student performance objectives are based on criteria that have been identified for each of the competencies listed in the Florida Curriculum Frameworks and Student Performance Standards (attached). Students are given an overall rating for the competency. Students must achieve an 80% or better on each skills area.

The ratings are as follows:

5- The student can perform this skill without supervision and with initiative and adaptability to problem situations.

4- The student can perform this skill satisfactorily without assistance or supervision.

3- The student can perform this skill satisfactorily but requires some assistance and/or supervision.

2- The student can perform parts of this skill satisfactorily, but requires considerable assistance and/or supervision.

1- The student cannot perform this skill even with constant supervision.

Students who score below a three (3) on the Performance Test will have the opportunity to repeat the learning activities, practice the preparation again and retake the Performance Test.

### **Knowledge**

One-third of the grade is based on written tests. The faculty will give knowledge tests at the completion of a module. The tests will be on the material covered. Students must achieve a 80% or better on each test. Students are given the opportunity to re-study and re-take the knowledge test if necessary.

### **Professional Skills**

Effective professional skills are the cornerstone to successful employment. Students are expected to demonstrate productive professional skills during all phases of enrollment. Faculty will work with students who need assistance in this area to improve the overall possibility for successful employment. Students must achieve an 80% overall in this area.

One-third of the grade is based on the Professional Skills Assessment Form, which includes:

**Attendance:** Attends class for all scheduled hours assigned, arrives/leaves on time, contribute to class discussion and is actively involved in all activities.

**Character:** Displays academic integrity (inclusive of not committing plagiarism), trustworthiness, dependability, reliability, self-discipline, and self-responsibility.

**Teamwork:** Respects the rights of others; is a team worker; is cooperative; ensures confidentiality in all classroom, clinical and other matters; demonstrates professional behavior in interactions with peers, preceptors, and faculty.

**Appearance:** Displays appropriate dress, grooming, hygiene, and wears full regulation uniform of the day.

**Attitude:** Displays a willingness to cooperate and accept constructive criticism; sets realistic expectations; approaches assignments with interest and initiative.

**Productivity:** Follows safety practices; conserves materials and supplies; maintains equipment; stays on task and utilizes time constructively; demonstrates proactive leaning through involvement in activities and contributions to class discussions.



**Organization:** Manifests skill in prioritizing and management of time and stress; demonstrates flexibility in handling change; completes assignments on time; uses work time appropriately.

**Communication:** Contacts faculty to report concerns; notifies faculty of tardy/absence one hour before start of class; seeks clarification and understanding through appropriate, pertinent questions.

**Leadership:** Displays leadership skills; appropriately handles conflict and concerns; demonstrates problem-solving capability; maintains appropriate relationships with supervisors/faculty and peers; follows the chain of command.

**Respect:** Deals appropriately with cultural/racial diversity; does not engage in harassment of any kind to include but not limited to verbal, nonverbal, and written; addresses faculty and peers in appropriate tone and with appropriate language to include but not limited to electronic (email, text, etc.) communications.

### **Program Progress**

Students are expected to complete the program of training within the hours allotted by the State of Florida for completion. The student's rate of progress will be closely monitored by the faculty to ensure program completion in a timely manner. Most tests, projects, and similar assignments must be completed in class under the direction of the instructor. Practice exercises may be completed at home. Practice exercises completed at home does not count toward hours in the program.

### **Requirements for a Certificate**

All competencies specified in the State of Florida Curriculum Framework for the program must be successfully completed with at least an 80 percent in the areas of skills, knowledge, and professional skills. Students must also meet minimum basic skills requirements prior to graduation.

## **STUDENT DRESS CODE**

Students who attend LTC shall dress in a manner appropriate for the job in which they are receiving training, including any special protective gear and professional uniforms. All clothing, makeup, and jewelry must be clean, neat, modest, in good repair, appropriately sized, and be neither distracting nor offensive.

The Executive Director or designee has the final authority for determining whether or not a student's apparel conforms to the dress code. If it is determined that it does not, students will be required to change into clothing which will conform to this code or leave campus. Students may return to campus when they have changed into appropriate clothing.

### **Minimum Program Dress Code**

1. Pants shall be worn fastened and at the waist. Pants should be straight legged or boot cut (jeans are acceptable). Baggy pants are not permitted in any program area. Baggy pants are considered to be more than one size larger than the individual's waist. Shorts are not permitted
2. Shoes must meet safety/industry standards. Open toed shoes are not permitted.
3. Program logo school T-shirts are to be worn.
4. For safety reasons, shorts, loose clothing, jewelry, and loose hair below the collar are not allowed.
5. Hats are only permitted in shop areas if required by the program master plan of instruction and must be worn appropriately (i.e., ball cap bills worn forward).

**Remember: students at this college are preparing for employment in positions where public relations are often a major factor. Individual desires may not always take precedence.**

## **GENERAL SCHOOL INFORMATION**

### **Campus Safety**

Lake Technical College makes every effort to provide a safe environment for all students, visitors, faculty and staff. Basic safety standards, which will include fire drills, weather drills, equipment usage, and traffic regulations, will be covered in the program orientation. These basic safety standards will be reinforced throughout the program enrollment. See the current school catalog for additional campus safety information.

### **Competency-based Instruction**

Any student who enters a LTC program with previous experience or educational background that would enable the student to successfully complete a test of competence in any area may, with the permission of the faculty, complete a test to measure that competence.

### **Follow Up**

Lake Technical College is proud of its graduates and celebrates the next step graduates take whether it is employment, military or further education. Prior to completing, students may visit the Career Success Center for assistance with

employability skills such as resume writing. In addition, faculty may provide students with employment leads. However, it is up to the individual student to actively pursue employment opportunities. We like to hear how our graduates are doing and want to celebrate your successes so be sure to communicate with your faculty any employment, military, or further education you enter. Students are required to participate in an Exit Interview prior to their last day in their program.

### **Food and Drink**

To protect equipment and furnishings in the classroom and laboratory areas, only water, in closed, covered containers, is permitted. No other food or drinks are allowed, unless specific permission is granted by the faculty. However, under no circumstance may food or drinks be in the laboratory areas.

### **Lunch**

Food services are provided on the main campus by the Culinary Institute and are available during breaks and lunch. Students may leave the LTC campus during the scheduled 30-minute lunch break as long as they return to the program on time.

### **Parking Regulations**

Students may park only in the south parking lot in spaces not designated as staff or customer service parking. For safety, loitering in or around vehicles once the vehicle is parked is not allowed and a 5 mph speed limit is enforced. In consideration of the neighbors and classes in session, loud music in vehicles on campus is prohibited.

### **Smoking**

Lake Tech is a tobacco free institution. The use of tobacco products of any kind, including e-cigarettes, is not permitted at any LTC location, including the parking lots.

## **FINANCIAL AID**

Policies and guidelines for the administration of all financial aid are established according to federal and state law. Applicants complete an information form, Free Application for Federal Student Aid, and furnish documentation needed to verify eligibility. More information on the application process may be obtained in the Financial Aid Office.

The Financial Aid Office will assist students, where possible, with access to financial support offered by federal agencies (U.S. Department of Education – Pell Grants, Department of Veterans' Affairs), other state and local agencies and local organizations (scholarships).

## **COURSE PREPARATION**

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning (A/C), and refrigeration and ventilation industry. This program prepares students for employment as A/C, Refrigeration and Heating Helper, A/C, Refrigeration and Heating Mechanic Assistant, A/C, Refrigeration and Heating Mechanic, A/C, Refrigeration and Heating Technician, and Refrigeration Technician (SOC 49-9021).

The student should obtain EPA certification prior to leaving school in order to be employed in any job that requires work with refrigerants.

This program focuses on broad, transferable skills, stresses the understanding of the heating, air-conditioning, refrigeration and ventilation industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, the underlying principles of technology, and health, safety, and environmental issues.

## **PROGRAM OBJECTIVES**

See the attached Florida State Department of Education curriculum framework for program objectives and desired competencies.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Air-Conditioning, Refrigeration and Heating Technology 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Architecture and Construction

**NOTE:** This program has been daggered for deletion with 2019-2020 being the last cohort of students permitted to enroll in the program. After 2019-2020, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion. Program replaced by Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Part 1 - C400410.

Career Certificate Program	
Program Number	C400100
CIP Number	0647020107
Grade Level	30, 31
Standard Length	750 Hours
Teacher Certification	Refer to the <b>Program Structure</b> section.
CTSO	SkillsUSA
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

### Purpose

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning, and refrigeration and ventilation industry. The student should obtain EPA certification prior to leaving school in order to be employed in any job that requires work with refrigerants. This program focuses on broad, transferable skills, stresses the understanding of the heating, air-conditioning, refrigeration and ventilation industry and demonstrates elements of the industry such as planning, management, finance, technical and production skills, the underlying principles of technology, and health, safety and environmental issues.

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Architecture and Construction career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Architecture and Construction career cluster.

The content includes but is not limited to designing, testing and repairing heating, ventilation, air-conditioning and cooling (HVAC) systems.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

### Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length	SOC Code
A	ACR0041	Air Conditioning, Refrigeration and Heating Helper	AC HEAT ME	250 Hours	49-9021
B	ACR0043	Air Conditioning, Refrigeration and Heating Mechanic Assistant		250 Hours	49-9021
C	ACR0047	Air Conditioning, Refrigeration and Heating Mechanic 1	REFRG MECH 7 G	250 Hours	49-9021

### Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

### Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate the importance of health, safety and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 02.0 Identify, use and maintain the tools and tool accessories used in the heating, air-conditioning and refrigeration industry.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Demonstrate a practical knowledge of basic electricity and of the electrical components of heating, air-conditioning and refrigeration equipment.
- 05.0 Troubleshoot heating, air-conditioning and refrigeration electrical control systems and their components.
- 06.0 Select and test electrical generation and distribution components for commercial heating and air conditioning systems.
- 07.0 Maintain, test and troubleshoot electrical motors and their components for commercial heating and air-conditioning systems.
- 08.0 Troubleshoot and wire electrical motors and their components.
- 09.0 Operate solid-state electronics as used in heating, air-conditioning and refrigeration systems.
- 10.0 Evaluate single-phase and three-phase power as used in heating, air-conditioning and refrigeration systems.
- 11.0 Explain the function of basic electronics.
- 12.0 Describe the history and concepts of heating, air-conditioning and refrigeration.

- 13.0 Explain the properties of matter and heat behavior.
- 14.0 Analyze fluids, pressures, refrigerants and related codes.
- 15.0 Evaluate heating, air-conditioning and refrigeration system components and accessories.
- 16.0 Select appropriate commercial compressors.
- 17.0 Test and adjust commercial evaporative condensers.
- 18.0 Maintain, test and troubleshoot commercial evaporators.
- 19.0 Fabricate and service the piping, tubing and fittings used in the heating, air-conditioning and refrigeration industry.
- 20.0 Identify basic principles of heating, air conditioning, refrigeration and ventilation piping sizing.
- 21.0 Utilize and operate mechanical refrigeration servicing and testing equipment.
- 22.0 Assist in the installation of a residential heating and air-conditioning system and determine start-up procedures.
- 23.0 Conduct start-up and check-out procedures for mechanical heating and air-conditioning systems.
- 24.0 Demonstrate a working knowledge of refrigerants and oils.
- 25.0 Conduct system startup and shutdown.
- 26.0 Explain the importance of employability and entrepreneurship skills.

Florida Department of Education  
Curriculum Framework

**Program Title:** Air-Conditioning, Refrigeration and Heating Technology 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Architecture and Construction

**NOTE:** This program has been daggered for deletion with 2019-2020 being the last cohort of students permitted to enroll in the program. After 2019-2020, no new students may be enrolled in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion. Program replaced by Heating, Ventilation, Air-Conditioning/Refrigeration (HVAC/R) Part 2 - C400420.

Career Certificate Program							
Program Number	C400200						
CIP Number	0647020108						
Grade Level	30, 31						
Standard Length	600 Hours						
Teacher Certification	Refer to the <u><a href="#">Program Structure</a></u> section.						
CTSO	SkillsUSA						
SOC Codes (all applicable)	49-9021 - Heating, Air Conditioning, and Refrigeration Mechanics and Installers						
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a>						
Basic Skills Level	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Mathematics:</td> <td style="text-align: right;">10</td> </tr> <tr> <td>Language:</td> <td style="text-align: right;">9</td> </tr> <tr> <td>Reading:</td> <td style="text-align: right;">9</td> </tr> </table>	Mathematics:	10	Language:	9	Reading:	9
Mathematics:	10						
Language:	9						
Reading:	9						

### Purpose

The purpose of this program is to prepare students for employment or advanced training in the heating, air-conditioning, and refrigeration and ventilation industry. This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Architecture and Construction career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Architecture and Construction career cluster.

The content includes but is not limited to designing, testing and repairing heating, ventilation, air-conditioning and cooling (HVAC) systems.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

### Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer. There are two course options, ACR0044 OR ACR0045, for occupational completion point B.

**Air-Conditioning, Refrigeration and Heating Technology 1** is a core program. It is recommended student completes **Air-Conditioning, Refrigeration and Heating Technology 1**, or demonstrates mastery of the outcomes in that program, prior to enrollment in **Air-Conditioning, Refrigeration and Heating Technology 2**.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length	SOC Code
A	ACR0049	Air Conditioning, Refrigeration and Heating Mechanic 2		250 Hours	49-9021
B	ACR0044	Air Conditioning, Refrigeration and Heating Technician <b>OR</b> Refrigeration Mechanic	AC HEAT ME	350 Hours	49-9021
	ACR0045		REFRG MECH 7 G	350 Hours	

### **Common Career Technical Core – Career Ready Practices**

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

### **Standards**

After successfully completing this program, the student will be able to perform the following:

- 27.0 Use combustion-type heating servicing and testing equipment.
- 28.0 Troubleshoot combustion gas valves and regulators as used in heating, air-conditioning, refrigeration and ventilation systems.
- 29.0 Maintain, troubleshoot and repair commercial heating systems.
- 30.0 Explain how to install, maintain and repair heating, air-conditioning and refrigeration systems.
- 31.0 Demonstrate knowledge of retail refrigeration systems.
- 32.0 Demonstrate knowledge of commercial and industrial refrigeration systems.
- 33.0 Develop an understanding of hydronic systems.
- 34.0 Determine the properties of air.
- 35.0 Use a pressure enthalpy chart to diagram refrigerant cycles.
- 36.0 Explain the standards for and ways to measure indoor-air quality.

- 37.0 (Optional) Identify and understand pneumatic control systems for commercial heating and air-conditioning applications.
- 38.0 Develop an understanding of chilled systems.
- 39.0 (Optional) Maintain and repair thermal storage systems.
- 40.0 Read construction documents.
- 41.0 Interpret, use and modify construction drawings and specifications.
- 42.0 Design heating and cooling systems.
- 43.0 Troubleshoot and repair commercial heating and air-conditioning systems.
- 44.0 Calculate commercial heating and air-conditioning loads.
- 45.0 Install air distribution systems.
- 46.0 Evaluate commercial airside systems.
- 47.0 Balance an air distribution system.
- 48.0 Select energy conservation equipment.
- 49.0 Analyze building management systems.
- 50.0 Recommend alternative heating and cooling systems for various case studies.
- 51.0 Demonstrate a working knowledge of electrical generation and distribution components for commercial heating and air conditioning systems.
- 52.0 Demonstrate a working knowledge of refrigeration-system vibration and insulation.
- 53.0 Apply commercial refrigeration-pipe sizing and troubleshooting procedures.
- 54.0 Use refrigeration-systems skills in commercial applications.
- 55.0 Demonstrate a working knowledge of refrigerated storage systems.
- 56.0 Diagnose, maintain and repair ice-making systems.
- 57.0 Use refrigeration electrical-system skills in commercial applications.
- 58.0 Maintain and troubleshoot commercial refrigeration systems.