**Introduction to HVAC**

**Course Code:**  **47.5140000-11**

Houston County Career Academy

**Teacher:** Mr. Fletcher **Email:** lucus.fletcher@hcbe.net

**Room Number:** 602 **Phone Number:** 478.322.3280

**Semester:** Winter 2020 **Club Days:** TBD

**Textbook:** Refrigeration & Air Conditioning Technology **Club Hours:** 3:00 – 4:30

**Textbook Price:** $75 **Club Location:** Room 602

**Department Philosophy:** Our goal at Houston County Career Academy is to promote the success of each student. Students are expected to take advantage of all opportunities for success, which are made available to them by all teachers.

**Course Description:** This Pathway is designed to prepare a student with foundational knowledge and skills for a construction career in one of three possible construction crafts. It also is a good pathway for a student to prepare for a variety of opportunities in addition to the craft areas, such as Architecture, Construction Engineering and Construction Management.

As the student progresses through the pathway, they are given the opportunity to explore three construction craft areas on an introductory level. These areas are HVAC, Electrical, and Sheet Metal.

**Course Prerequisites:** There are no prerequisite courses for the first year of construction: Occupational Fundamentals and Safety. However, advancement into higher level classes will require passing Occupational Fundamentals and Safety, with at least a “C” - 70% grade.

**Articulation:** TBD. Articulation is the process by which academic or technical credits earned through high school programs may be acceptable in transfer by various community colleges and some four-year institutions. Credits earned appear on a college transcript. This course is currently not articulated.

**Career Pathways:** Courses must be completed in the order listed below.

**\***Semester 1 – Industry Fundamentals & Safety

**\*** Semester 2 – Introduction to HVAC

**\*** Semester 3 – Low Voltage Electrical (Dual Credit with CGTC)

**\*** Semester 4 – HVAC (Dual Credit with CGTC)

**\*** Semester 5 – Youth Apprenticeship or classes at CGTC

 Level 5 – Construction Internship

Grades 9-12

**\* Required for Pathway Completion**

**Certifications:** Upon successful completion of four semester units within this Pathway the student will test for their HVAC 608 credential and they will also earn an Air Conditioning Electrical Technician Technical Certificate of Credit (TCC) from Central Georgia Technical College (CGTC).

**Careers in the trades:**

**Occupation Level of Education Avg. Salary**

**HVAC GED or higher $25,178 - $78,507**

**Plumber GED or higher $26,592 - $75,368**

**Electrician GED or higher $31,936 - $76,635**

**Internet Acceptable Use:** Use of the Internet must be in support of education and research and consistent with the educational objectives of the Houston County School System. The use of the internet is a privilege, not a right; an inappropriate use will result in cancellation of those privileges. Any student use not complying with the Houston County School System’s Internet Acceptable Use Agreement shall lose Internet privileges for a designated period of time.

**CTSO:** (Career & Technical Student Organization) The CTSO for the HVAC Club is SkillsUSA and Mr. Fletcher, Mr. Waters and Mrs. Blunt are the SkillsUSA advisors. **All** students are encouraged to join SkillsUSA**.** Dues are only $20.00 per year. SkillsUSA meets approximately twice per month and concentrates on developing leadership, resume building, hard and soft interpersonal/communication skills, as well as extra technical skills not covered in class. More information will be disseminated to students as the coming year’s course work is provided.

**Georgia Performance Standards:** Performance standards provide clear expectations for assessments, instruction, and student work. They define the level of work that demonstrates achievement of the standards. The performance standards isolate and identify the skills needed to use the knowledge and skills to problem-solve, reason, communicate, and make connections with other information.

**Standards Covered in this Course:**

**ACT-OSF-1.** Demonstrate employability skills required by business and industry.

* a. Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.
* b. Demonstrate creativity with multiple approaches to ask challenging questions resulting in innovative procedures, methods, and products.
* c. Exhibit critical thinking and problem solving skills to locate, analyze, and apply information in career planning and employment situations.
* d. Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.
* e. Apply the appropriate skill sets to be productive in a changing, technological, and diverse workplace to be able to work independently, interpret data, and apply team work skills.
* f. Present a professional image through appearance, behavior, and language.

**ACT-OSF-2. Demonstrate using hand and power tools associated with the HVACR trade in a professional and safe manner.**

* a. Demonstrate the ability to correctly use the following: pipe wrenches, torque wrenches, hammers and mallets, tin snips, hand and power hacksaws, drills, and measuring instruments.

**ACT-OSF-3. Identify and describe electrical circuitry associated with the HVACR trade and apply mathematical concepts.**

* a. Recognize and describe the purpose and operation of the various electrical components used in HVACR equipment
* b. Identify different types of resistors and explain how their resistance values can be determined.
* c. Distinguish between series, parallel, and series parallel circuits
* d. Demonstrate proper use of a multi meter and ammeter.
* e. Calculate volume, weight, pressure, vacuum, and temperature related to the HVACR trade

**ACT-OSF-4. Demonstrate the ability to test various electrical components in a HVAC system.**

* a. Demonstrate testing contactors, relays, transformers, bi-metal thermostats, electrical heating elements, capacitors, and solenoids
* b. Demonstrate checking a compressor electrically using resistance readings.

**ACT-OSF-5. Demonstrate installing and troubleshooting thermostats.**

* a. Identify and explain the types and operation of thermostats
* b. Identify and explain the low voltage side of the HVAC system.
* c. Demonstrate correct thermostat installation procedures.

**ACT-OSF-6. Describe how an HVACR system conditions, cools and heats the air within a specified space.**

* a. Explain the three methods of heat transfer
* b. Demonstrate an understanding of the basic refrigeration cycle.
* c. Recognize the major components of a cooling system and explain how they operate.
* D. Identify and describe refrigerants and demonstrate procedures for safe handling of them.

**ACT-OSF-7. Demonstrate how to operate the equipment used in the HVAC field**.

* a. Demonstrate proper operation of manifold gages
* b. Demonstrate proper operation of recovery machines, vacuum pumps, micron gages, charging scales, and leak detectors
* c. Demonstrate the ability to check superheat and sub cooling.
* D. Demonstrate recovering refrigerant, evacuating a system, and charging a system

**AC-OSf-8 Examine how SkillsUSA is a co-curricular part of career and technical education through leadership development, school and community service projects, and competitive events.**

* a. Explain the purpose, mission, objectives motto, colors, official dress and other distinguishing characteristics of SkillsUSA.
* b. Explain how participation in SkillsUSA can promote lifelong responsibility for community service, professional growth and development.
* c. Explore the impact and opportunities that SkillsUSA can develop to bring business and industry together with education in a positive working relationship through innovative leadership and career development programs.
* d. Explore the local, state, and national opportunities available to students through participation in SkillsUSA, including but not limited to conferences, competitions, community service, philanthropy, and other SkillsUSA activities.

The **Common Core Georgia Performance Standards (CCGPS**) were developed from the Common Core State Standards, an initiative of the National Governors’ Association and the Council of Chief State School Officers, who took leadership in working to chart a course to ensure all students are better prepared for college and future careers. The Common Core Georgia Performance Standards go a long way to ensure that students in different states have the same opportunities to learn at high levels and reach towards higher standards.

The **CCGPS** are aligned to the highest international and national standards and have an increased

emphasis on the following:

 Reading more informational and complex texts

 Writing to justify thinking and reasoning and writing for more authentic purposes

 Engaging in more problem‐solving and problem‐based learning

 Making more real‐world, relevant connections

 Assessing learning at higher‐levels

**Grading Scale**

|  |  |
| --- | --- |
| **Area** | **Percentage (%)** |
| **Class Work & Labs****Quizzes & Performance Exams** **Tests****Final Exam – Comprehensive** | **15%****20%****45%****20%** |

**Required Materials:** 1” Notebook and 5-tab Dividers, Flash drive, Pen, Pencil, Loose Leaf Notebook Paper, and 4x6 index cards.

**Parental Involvement:** Parent(s), you are a vital part of your child’s success? We can’t do it without you. Currently there are no planned activities outside of SKILLSUSA events. (we may need your assistance) However, our advisement board is set to convene during the first quarter of school and one of the topics will We’ll keep you informed on any updates with these service projects.

**Classroom Expectations:**

1. Respect yourself, your classmates, the teacher, and school property.
2. Be on time.
3. Honesty is expected. (Cheating will not be tolerated!)
4. Keep the room, lab, and your area clean and safe.
5. No drinking (except water) or eating during class.
6. No cell Phones in class, unless it is BYOD Day (Students will know ahead of time)
7. Use the restroom and get water either before class or during restroom breaks.
8. All HCCA rules from the student handbook will also be enforced.

**Late Assignments:** Each student is expected to complete each assignment on time. Late assignments are penalized, minus 10 points, each day the assignment is late. Students will not be penalized while they are out of school for excused absences. They will be given 3 days upon their return before points are deducted.

**Make-up Policy:** IT IS THE STUDENT’S RESPONSIBILITY TO OBTAIN AND COMPLETE MAKE-UP WORK. If you have an excused absence, you will have 3 days upon return to turn in work before it will be marked a zero.

**Discipline Policy:**

**1st offense =** Official Verbal Warning

**2nd offense =** Referral to Administrator

**\*\*\* NOTE 1: *At any point, based on the severity of the offense, a student can be removed from the educational environment if the offense is deemed severe enough. Repeat offenders for the same violation can also skip step 1 or step 2 if they continue to exhibit the negative or unsafe behavior. \*\*\****

**\*\*\* NOTE 2*: If students exemplify exceptional behavior then they will be rewarded with special privileges or prizes that only are advantageous during their class period\*\*\****

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**CHEATING**

Cheating is defined as any of the following: plagiarism; copying the work of others when the material is graded or is taken up to be graded later; giving or receiving unauthorized information on any graded assignment; communicating during a test or quiz; using, or being in the possession of, notes or other sources of information during a test or quiz (unless it is an open notes test); giving or taking of information about a test or quiz; asking a question during a test or quiz where the question itself provides information to those taking the test; the keeping of a test or quiz paper for the purpose of passing it to others; storing information for retrieval in any electronic device or transmitting information from one electronic device to another (i.e. cell phone, palm pilot, or similar device) when forbidden to do so by the teacher.

When proof has been established that a student has been involved in cheating, parents are to be notified by the teacher and the student will receive a grade of zero for the test or evaluation material and a grade of “U” in conduct for the term. Additional consequences could range from Saturday School to Out of School Suspension depending on the severity of the infraction.

**Acknowledgement of Receipt:** By signing below, the student and parent/guardian acknowledge that they have read and understood the contents in the2018-2019 Intro to HVAC syllabus.

\* **PLEASE SIGN & RETURN TO MR. Fletcher BY 10 January, 2020**

Student Name (Print) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Email \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Name (Print) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Email \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Contact # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NOTE: *CTAE Pathway completers (students who successfully complete the pathway and pass the End of Pathway Test) will receive a certificate of completion at the end of the semester.  They will also have the opportunity to purchase a red academic chord for academic recognition at graduation.  Chords can be purchased for $10.00, and payment will be due on the day of testing (Checks only—no cash will be accepted).  Students who do not pass the test will not receive a chord and will be refunded the $10.00.  Checks can be made payable to Northside High School.  End of Pathway testing will occur at the end of second semester.***

**SAFETY CONTRACT FOR HVAC**

**I will:**

* **Follow all safety rules and instructions given by the teacher.**
* **Use all protective equipment as instructed.**
* **Observe & Follow the class expectations and all NHS policies.**
* **Protect my eyes, hands, hearing, face and body while working in the shop as outlined by OSHA and my safety training.**
* **Do NOT operate any tools or equipment unless instructed to do so.**
* **Carry out good housekeeping practices daily.**
* **Contact the teacher and/or administration in case of an emergency.**
* **Know the location of emergency exits, first aid, fire extinguishers, fire alarms, eye wash stations, first aid kits, and telephones.**
* **Conduct myself in a responsible manner at all times, and act like an adult.**
* **Pass the safety test with a 100% before being allowed to perform any lab activities or any hands on work. I know I have 3 attempts in class to do this**

***I have read and agree to abide by the safety regulations, class expectations, and directions given by the instructor. I agree that in the interest of safety, I must conduct myself in a professional manner at all times. I also understand that if I fail to abide by these rules and expectations, in the interest of safety to all students, I may be removed from the class.***

***I also understand that if my behavior continues to put others or myself at risk, I may be dismissed from the program entirely.***

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 **Print Student Name Student Signature Period Date**

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 **Print Parent/Guardian Name Parent/Guardian Signature Date**

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**Parent Permission Form**

I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, give my child, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, permission to participate in the HVAC course. I understand that my child will be in a classroom and laboratory environment. I also understand that my child will be required to learn the skills and technical aspects of the construction industry. The HVAC OSHA course specifically explains the safety obligations of workers, supervisors, and managers to ensure a safe workplace. Course content discusses the causes and results of accidents and the dangers of rationalizing risks. It includes the basic content of OSHA 10-hour safety standards. It also includes the basic knowledge and skills needed in the following areas: construction math, hand and power tools used in the field, general blueprints, and basics of rigging safety.

By signing below I acknowledge that my child will be in potentially unsafe environments using dangerous equipment. ONLY personnel and students that have been signed off by the teacher will be allowed to operate any and all machinery and tools from the construction lab. Each student will be required to pass each tool and safety sign off with 100% competency before being afforded the privilege of working with the course aligned trade tools.

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 **Print Parent/Guardian Name Parent/Guardian Signature Date**

**TOOL RESPONSIBILITY FORM**

I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, understand that my child, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, will have the unique opportunity to work with trade hand and power tools in the Intro HVAC Course. Each student will have passed each tool and safety sign off with 100% competency before being afforded the privilege of working with the course aligned tools.

Due to the high cost of all tools and materials, if a student knowingly breaks any tools they will be required to replace the tool at an equal or greater value. All tools and materials from the course are the property of the Construction Program @ HCCA and are paid out of the course’s budget. Each student is again responsible for ANY broken tools or materials they use and must replace those at their cost of an equal or greater value.

**\*\*\* NOTE: Signature on this form is required before permission will be granted for any student to participate in the program. \*\*\***

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 **Print Student Name Student Signature Period Date**

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 **Print Parent/Guardian Name Parent/Guardian Signature Date**