HVAC FUNDAMENTALS  
Course Syllabus

Course Number: ACA-1001  
OHLAP Credit: No
OCAS Code: None  
Course Length: 45 Hours
Career Cluster: Architecture & Construction  
Career Pathway: Construction  
Career Major(s): Construction Academy

Pre-requisite(s): This course is an introduction to the heating, ventilation, air conditioning, and refrigeration industries and related occupations. Students will learn about the components of an HVAC system, blueprints, and work on a live project constructing an HVAC system.

Textbooks:

Course Objectives:
A. Complete Orientation to the HVAC/R Industry.
1. Discuss the history and trends of the industry. ¹
2. Discuss additional training available.
3. Discuss State/National certification requirements. ¹

B. Work as a Member of a Team and Practice Good Customer Service Skills. ¹
1. Describe traits of a good employee.
2. Discuss the basic principles of teamwork.
3. Work as a team member toward a common goal.
4. Discuss the importance of accurate communication with customers.

C. Demonstrate Good Safety Practices. ¹
1. Discuss the role of OSHA and EPA in the Air Conditioning, Heating and Refrigeration industry.
2. Discuss types and location of fire extinguishers.
3. Match types of fire extinguisher with description of fire.
4. Demonstrate proper lifting methods.
5. List personal safety rules.
6. Discuss accident prevention.
7. Discuss current laws concerning "hazardous waste management" as it relates to HVAC industry.
8. Complete a safety pledge form.
9. Complete an individual shop safety inspection.
10. Pass safety test with 100% accuracy before working in shop.
D. **Describe Proper Safety Procedures.**

1. Describe proper procedures for working with pressurized systems and vessels.
2. Describe proper procedures for working with electric energy.
3. Describe proper procedures for working with heat.
4. Describe proper procedures for working with cold.
5. Describe proper procedures for working with rotating machinery.
6. Describe proper procedures for working with chemicals.

E. **Identify and Use Air Conditioning & Heating Tools and Equipment.**

1. Identify hand tools commonly used in the air conditioning, heating, and refrigeration trade.
2. Discuss proper use and care of hand tools.
3. Select and use the right tool for the right job.
4. Describe equipment used to install and service air conditioning, heating, and refrigeration systems.
5. Maintain tools.

F. **Identify and Use Air Conditioning and Heating Specialty Tools and Equipment.**

1. Match specialty tools with the type of jobs for which they are used.
2. Discuss procedure for working with high-pressure cylinders.
3. Explain operation and care of torches.
4. Use air-acetylene and oxyacetylene torches.
5. Discuss usage and operation of electrical test instruments.
6. Use electrical test instruments to diagnose problems.

G. **Identify Types of Pipe and Tubing Used in Refrigeration Systems.**

1. List types of tubing used in heating, air conditioning and refrigeration.

H. **Shape, Form, Fit, and Solder Copper Tubing.**

1. Measure, cut and ream copper tubing.
2. Flare, swage, and bend copper tubing.
3. Demonstrate proper procedure for cleaning copper before soldering or brazing.
4. Discuss conditions for creating capillary action of solders.

I. **Construct Piping Project.**

1. Interpret piping diagram; collect necessary tools and materials.
2. Measure, cut, and ream pieces of copper needed for project.
3. Swage, flare, and bend copper; then fit together as shown on diagram.
4. Braze all copper joints.
5. Pressurize with nitrogen and test for leaks.

J. **Identify Electrical Symbols Used in Schematics and Diagrams.**

1. Draw and identify electrical symbols used in air conditioning applications.
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2. Match schematic symbols to component names.
3. Differentiate between a pictorial and a ladder type wiring schematic.
4. Compare pictorial type diagrams and ladder type schematics.
5. List the advantages of having both types of diagrams to troubleshoot a unit.

1 HVAC Technician Skills Standards - Aligns with Partnership for Air-Conditioning, Heating, Refrigeration Accreditation

1 ODCTE objective
2 NCCER objective

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment: Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit: The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.