Course Number: ARCO-0686

OHLAP Credit: No

OCAS Code: None

Course Length: 45 Hours

Career Cluster: Architecture & Construction

Career Pathway: Maintenance/Operations

Career Major(s): HVAC Technician

Pre-requisite(s): Introduction to HVAC/R, Safety, Tools and Equipment; Principles of Thermodynamics and Heat Transfer.

Course Description: This course covers the essentials knowledge and skills necessary to understand airflow principles and duct design; install, and repair duct systems; measure and balance air flow; and troubleshoot and repair air flow problems. Student will be prepared to identify appropriate filtration for an air system, i.e. mechanical and electronic, and install, troubleshoot, and maintain filtrations systems. Extensive coverage will be given to the different types of fans and blowers, testing for blower motor loading, correct rotation, and adjustment to change the volume of air moved.

Textbooks:


Refrigeration & Air Conditioning Technology, 7th Ed, (2013), Whitman /Johnson/ Tomczyk Silberstein / Publisher Delmar Cengage


Course Objectives:

   1. Draw layout of return and supply runs.¹
   2. Calculate equivalent length of trunk and branch ducts.¹
   3. Calculate total effective length of duct runs.¹
   4. Calculate total available static pressure.¹
   5. Size trunk and branch ducts by equal friction method.¹
   6. Use duct calculator to find duct size, velocity, cfm, and friction loss.¹
   7. Calculate air flow factors for heating and cooling.¹
   8. Size registers, grilles, and diffusers.¹
   9. Fabricate fittings.¹
   10. Fabricate a "HAND" pittsburg.¹
   11. Fabricate "HAND" slips and drives.¹
   12. Identify and use all basic hand-held sheet metal tools.¹
   13. Identify and use all basic hand-held tools for duct board.¹

B. Explain Mechanical and Electronic Filtration.
   1. Identify types of mechanical filters.¹
AIR HANDLING

1. Disposable
2. Permanent foam, mesh, and fiber
3. High efficiency
4. HEPA
5. Electrostatic

2. Describe operation of electronic air cleaners.
3. Install air cleaner system into existing ductwork.
4. Remove and clear prefilter and cells:
   a. Check ionizer wires
   b. Test power pack

C. Understand Fans/Blowers.
   1. Identify different types of fans/blowers:
      a. Centrifugal
      b. Axial
   2. Determine the proper direction of rotation
   3. Explain the difference between tube axial and vane axial.
   4. Identify the types of centrifugal fans/blowers:
      a. Forward curved
      b. Backward curved
      c. Air foil
      d. Radial tip
   5. Check for proper rotation
   6. Interpret the fans/blowers curve
   7. Select the fans/blowers via the curve
   8. Check fans/blowers performance via curves
   9. Check amp draws

D. Understand Air Distribution Systems.
   1. Describe the airflow and pressures in a basic forced-air distribution system
   2. Explain the differences between propeller and centrifugal fans and blowers.
   3. Identify the various types of duct systems and explain why and where each type is used
   4. Demonstrate or explain the installation of metal, fiberboard, and flexible duct
   5. Demonstrate or explain the installation of fittings and transitions used in duct systems.
   6. Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
   7. Demonstrate or explain the use and installation of dampers used in duct systems.
   8. Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
   9. Identify the instruments used to make measurements in air systems and explain the use of each instrument.
   10. Make basic temperature, air pressure, and velocity measurements in an air distribution system.

E. Design Central Air Conditioning Duct System.
   1. List types of fans used in air conditioning systems.
   2. Describe characteristics of the propeller and the centrifugal blowers.
   3. Explain what constitutes good airflow through a duct system.
   4. Describe a return air system
   5. Plot air flow conditions on the air friction chart.
7. Define air flow terms.
8. Describe the extended plenum and the reducing plenum designs.
9. Discuss advantages and disadvantages of using flexible duct.
10. Design and size a central air duct system.
11. Install ductwork in system and balance air flow.
12. Select air handling equipment with proper air capacity.
13. Design and size the supply and return duct system for a residence.
14. Select the proper supply and return grilles for the air distribution system.
15. Solve problems concerning factors affecting system design with the effects they have on the system by observation of the water table.
16. Analyze types of filters and air cleaners used in residential applications.
17. Size the duct system using computer program.

1 ODCTE objective
2 NCCER objective
All unmarked objectives are TTC instructor developed.

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.