

1. Module details

Module name

HVAC AIR SYSTEMS

Nominal duration

One module

It is anticipated that students will achieve the competencies specified in 35 to 40 hours.

Module codes

EA131

Discipline code

2. Module purpose

To provide the student with the knowledge of air flow and distribution principles used in HVAC Systems. They should be able to identify different system configurations, design a single one-air distribution system and service related system component.

3. Prerequisites

NR014 - Air Conditioning Systems
NR013 - Ventilation
or EA146 - Introduction to Air Conditioning
and EA050 - Engineering Computing

4. Relationship to competency standards

TBA

5. Content

1. Air Distribution Principles
 - air diffuser selection
 - factors affecting the design of ductwork systems
 - types of ductwork systems
 - static, velocity and total pressure
 - laminar and turbulent flow
 - moody diagram
 - parameters that control cost
2. Pressure loss
 - friction and dynamic
 - Colebrook - White formula
 - in ducts, friction charts
 - in fittings, loss co-efficients
 - fitting selection criteria
 - diffuser pressure loss
3. System sizing
 - velocity method
 - equal friction method
 - static regain method
 - balanced pressure drop method
 - circular to rectangular equivalent
 - standard duct sizes and gauges
 - balancing

- 4. Heat and leakage losses
 - heat gain/loss calculation
 - bare vs insulated
 - leakage
- 5. Overview of noise in duct systems
 - noise sources in duct systems
 - attenuation
 - impact on design
 - methods of control
- 6. Fans
 - types and characteristics
 - fan laws
 - system effect
 - fan selection
 - fan and system curves
- 7. Air systems
 - dual and single duct constant volume
 - variable volume
 - induction units
 - multi-zone
 - diversity factors

6. Learning outcome details

Learning outcome 1

Assessment criteria

On the completion of this module, the learner will be able to:

Describe the distribution principles necessary to ensure effective airflow to meet process requirements.

Short answer questions.

- 1.1 Differentiate between static, velocity and total pressure.
- 1.2 Define all related terms as applied to fluid flow.
- 1.3 Describe factors that affect the design and cost of ductwork system.
- 1.4 Identify and name all system components.
- 1.5 From a Moody Diagram, determine the friction factor for a given air flow and duct material.

Learning outcome 2

Assessment criteria

Apply the skills necessary to design a duct distribution system for a commercial building.

Assignment.

- 2.1 Design a single zone air conditioning air distribution system using the equal friction and balanced pressure drop methods manually.

Learning outcome 3	Select an appropriate fan for a given duct distribution system.
Assessment criteria	<p>Short answer questions. Assignment.</p> <p>3.1 Differentiate between different fan types.</p> <p>3.2 Define and apply basic fan laws to solve practical problems.</p> <p>3.3 Determine and apply System Effect Factors.</p> <p>3.4 Make a fan selection for the duct distribution system in learning outcome 2.</p>
Learning outcome 4	Design a duct distribution system using an industry accepted computer program.
Assessment criteria	4.1 Design the single zone air distribution system from learning outcome number 3. Explore different means of reducing the cost of this duct distribution system.
Learning outcome 5	Identify and describe the method of operation of different air conditioning systems given in diagrams and/or specifications.
Assessment criteria	<p>Short answer questions.</p> <p>5.1 Describe the operation and application of each major type of terminal units.</p> <p>5.2 Differentiate between constant volume and variable volume type systems.</p> <p>5.3 Differentiate between high and low velocity systems.</p>
7. Assessment Strategies	See Assessment Criteria.
8. Module Delivery Strategies	
9. Resource Requirements	<p>AIRAH Application Manual DA3, Air Conditioning Duct Design Manual</p> <p>ASHRAE Handbooks</p> <p>AS1668 parts 1 & 2</p> <p>AIRAH DA Fans</p> <p>Software</p> <p>DONKEY</p>

