

**1. Module details****Module name****Commercial Air Conditioning Systems Design****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

**Module code**

NUE351

**Discipline code**

0703310

**2. Module purpose**

This module will provide the student with the knowledge and skills necessary to design and select direct expansion air conditioning systems, equipment, ductwork and components for commercial applications.

**3. Prerequisites**

EA131 HVAC Air Systems.  
EA139 Heat Load Estimating (Commercial Refrigeration).  
EB141 Industrial Air Conditioning-Codes and Regulations.

**4. Relationship to competency standards**

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from NUEITAB.

**5. Content****Design parameters for single-storey buildings (eg offices, restaurants, hotels, bars)**

Customer and objective  
Customer concept of environment desired  
Economics  
Client brief

**Relevant design criteria**

Building purpose, location, orientation and shape  
External environment ambient conditions  
Internal load diversity  
Thermal capacity behaviour  
Thermal load (full and partial)

**Zoning and building usage**

Space and building  
Occupancies, single purpose, multi-purpose

**System selection criteria**

Economics  
Environment  
Control requirements

Existing structures  
New structures  
System components  
Space for equipment and system  
Selection of appropriate system, equipment, ductwork and components

**Systems and applications**

Design features, engineering and selection procedures for direct expansion air conditioning systems:

- RAC's, split systems, package units
- Free blow and ducted fan coil units
- Cooling, heat pump and electric heating

**6. Assessment strategy**

**Assessment methods**

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

**Conditions of assessment**

Learning and assessment will take place in an environment that is conducive to a learner's development.

**7. Learning outcome details**

**Learning outcome 1**

**Specify design criteria and considerations for various types of air conditioning systems.**

**Assessment criteria**

- 1.1 Establish and list typical design parameters for commercial air conditioning applications.
- 1.2 List and define all design criteria for commercial air conditioning applications.

**Learning outcome 2**

**Specify zoning and usage requirements for a given application and describe the various types of appropriate air conditioning systems.**

**Assessment criteria**

- 2.1 List and define relevant building construction features and proposed building usage requirements that determine zoning of the air conditioning system.
- 2.2 Prepare system selection criteria to aid the selection of the most appropriate system for specific applications.
- 2.3 List air conditioning system types typical of those used in commercial air conditioning applications, and detail the system design features and suitable applications of each.
- 2.4 Given building construction features and proposed building usage requirements, determine zoning of the air conditioning system, select an appropriate system, and complete a summary of the system equipment arrangement.

**Learning outcome 3**

**Produce air conditioning designs for typical plant to include multizone applications.**

**Assessment criteria**

- 3.1 Given a design brief, building floor and structural plans, and building heat load analysis, select the appropriate air conditioning system type.
- 3.2 Prepare a detailed design of the system including all equipment selections, arrangements and layouts, all air quantities.
- 3.3 Demonstrate that sound energy conservation techniques have been employed in the design.
- 3.4 Prepare a cost analysis to provide the optimum balance between system thermal and acoustic performance, capital cost and running cost.

**8. Delivery of the module**

**Delivery strategy**

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require learning outcome sequence other than that indicated in the module.

**Resource requirements**

*Suggested learning resources:*

AIRAH 1989. AIRAH Handbook.

AIRAH. Design Aids.

ASHRAE. ASHRAE Handbook, Fundamentals. Atlanta.

ASHRAE. ASHRAE Handbook, HVAC Systems. Atlanta.

AUBRCC 1990. Building Code of Australia. CSIRO, North Ryde.

Boyle. Australian Refrigeration and Air Conditioning. Trust publications.

Carrier Air Conditioning Company. Handbook of Air Conditioning Design, McGraw - Hill.

Local Council Regulations and Requirements

Environmental Protection Authority, Regulations and Requirements

**Occupational health and safety requirements**

A safe and healthy environment will be provided for students and teachers as well as the particular safety procedures followed as part of the learning / teaching activity and content.