

## 1. Module details

**Module name**

**HVAC LOAD ESTIMATING 2**

**Nominal duration**

One module

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

**Module codes**

**EB150**

**Discipline code**

## 2. Module purpose

To provide the student with the knowledge and skills necessary to carry out a detailed heat load analysis of a multiple zone industrial building using both manual as well as computer based methods. The student will also be able to analyse building thermal performance using building analysis and simulation software.

## 3. Prerequisites

EA134 - HVAC Load Estimating

EA135 - Applied Psychrometrics 1

## 4. Relationship to competency standards

TBA

## 5. Content

### 1. System design parameters

- human comfort
- system requirements in accordance with AS1668
- heat transfer calculations for complex structures and building components
- heat and radiation transfer calculations through complex glass structures including various internal and external shading devices
- indoor air quality
- olfs and decipols

### 2. Complex shading

- solar data, azimuth and altitude angles
- shading from adjacent structures

### 3. Computer software

- heat load estimating
- building performance analysis

This module contains learning outcomes that will require both theory and practical instruction. As such, it will require resources to facilitate both on and off the job delivery strategies.

## 6. Learning outcome details

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

---

**Learning outcome 1**

Carry out a detailed heat load analysis of a multiple zone industrial building using manual methods.

**Assessment criteria**

Short answer test.  
Project/assignments.

- 1.1 For a given building of at least 5 zones, manually determine the effective room sensible and latent heat of each zone at 2 hour intervals for each month of the year.
- 1.2 For each zone, identify peak effective room sensible latent heat loads, and the time of day and year they occur.
- 1.3 Using superposition principles determine the peak building (cumulative or block) load and the time of day and year at which it occurs.
- 1.4 Identify and list the methods and formulae to permit the calculation of: zone dehumidified air quantity, supply air quantity, zone duct air quantities, and refrigeration capacities, required for multiple zone systems employing constant volume variable temperature and variable volume constant temperature equipment.
- 1.5 Assuming an all air system is to selected, determine an appropriate ADP using block load and effective room sensible heat factor.

**Learning outcome 2**

Carry out a detailed heat load analysis of a multiple zone industrial building using computer based method.

**Assessment criteria**

Short answer test.  
Projects/assignments.

- 2.1 For a given building of at least 5 zones, carry out a detailed heat load analysis using computer based method.
- 2.2 Analyse results obtained using the computer based method to confirm reliability of results obtained.
- 2.3 Prepare a brief report comparing the manual and computer based methods.
- 2.4 Edit input data and compare results obtained with those previously obtained by computer based methods.

**Learning outcome 3**

Analyse building thermal performance using building analysis and simulation software.

**Assessment criteria**

Project/assignments.

- 3.1 Using commercially available and industry acceptable building analysis and simulation software, carry out an

---

## 7. Assessment Strategies

## 8. Module Delivery Strategies

## 9. Resource Requirements

analysis of the thermal performance of a given building.

- 3.2 Using check figures and industry standards, identify unusually high or unacceptably high thermal loads on a given building.
- 3.3 Prepare recommendations for changes in building design/treatment to reduce or eliminate unusually high or unacceptably high thermal loads on the given building.
- 3.4 Determine the improvement in the thermal performance on the given building by the application of building analysis and simulation software.

See Assessment Criteria.

This module contains learning outcomes that will require both theory and practical instruction. As such, it will require resources to facilitate both on and off-the-job delivery strategies.

These strategies may involve:

- co-operative registered off-the-job provider/employer delivery sharing available resources.
- delivery by an employer who is subregistered as an off-the-job provider, with qualified trainers in-house using resources to facilitate on and off-the-job delivery.
- off-the-job objectives should focus on the industry context while on-the-job objectives should reflect application within enterprise operations.

Assessment instruments will need to be developed by the module provider. These instruments will need to reflect consistency with stated module learning outcomes and related assessment criteria.

Student records will be the responsibility of the off-the-job provider and where more than one off-the-job provider is involved, formal processes for transfer of student information must be established.

AIRAH 1989. AIRAH Handbook

ASHRAE. Design Aids

ASHRAE. ASHRAE Handbook, Fundamentals. Atlanta

ASHRAE. ASHRAE Handbook, HVAC Systems. Atlanta

ASHRAE 62 - 89 Ventilation Standard

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

---

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

Department of Housing and Construction, 197-. Carrier System Design Manual, AGPS?

EU Guide Lines on Ventilation

Jones Air Conditioning Engineering

NATSPEC (latest edition) NATSPEC Volume 6 - Services Control Monitoring Security Refrigeration, Heating, Air Handling

SMACNA 1987. HVAC Systems Applications

AS1668 parts 1 & 2. The use of Mechanical Ventilation and Air Conditioning in Buildings

Stoecker W.F., Jones J.W., 1982. Refrigeration and Air Conditioning McGraw - Hill

The Trane Company 1986. Trance Air Conditioning Manual

Additionally, further information may be sourced from:

- journal articles
- software
  - Camel & Camlin
  - Carrier E20
  - Trane