

## 1. Module details

**Module name**

**PSYCHROMETRICS - ADVANCED**

**Nominal duration**

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

**Module codes**

**EB140**

**Discipline code**

## 2. Module purpose

To provide the student with the knowledge and skills necessary to accurately plot a complex psychrometric process, analyse air side systems, determine system performance and calculate the required plant capacity and airflow rates. Students will be able to solve psychrometric formulae and charts.

## 3. Prerequisites

EA135 - Applied Psychrometrics  
EA141 - Refrigeration Science

## 4. Relationship to competency standards

TBA

## 5. Content

1. Complex psychrometric processes
  - revise sensible cooling and heating and evaporative (adiabatic) cooling
  - cooling and dehumidification
  - cooling and dehumidification with high latent load
  - cooling and dehumidification all out door air
  - cooling and dehumidification all out door air with dehumidified air requirements less than supply air
  - cooling with evaporative humidification
  - cooling with near isothermal humidification
  - spray process to include cooling and dehumidification, cooling and humidification with heated spray water, heating and humidification.
  - partial load processes
  - reheat
  - bypass of, RA only and mix of RA & OA
  - variable air volume
  - variable coil effective surface temperature
  - split coil, horizontal, vertical and intertwined.
2. System performance
  - saturation efficiency of sprayers
  - system capacity calculated from air quantity and enthalpy change

3. Required plant capacity and airflow rates
  - effects of coil bypass factor and ADP
  - calculation of dehumidified air quantity, using both TSH and ERSH methods.
4. Recap on psychrometrics formulae and charts
  - properties of air
  - gas constants
  - derivation of air constants
  - combined gas laws
  - Dalton's law of partial pressures
  - Carrier's equation
  - psychrometric property tables
  - psychrometric charts
  - air mixing equations
  - air quantity equations
  - indirect evaporative coolers
  - analysis of cooling coil selection and performance
  - psychrometric analysis of:
    - air conditioning in tropics
    - all outdoor air
    - LCV/HWF systems
  - psychrometric analysis using equations and tables

## 6. Learning outcome details

### Learning outcome 1

#### Assessment criteria

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

Solve psychrometric problems using psychrometric formulae charts.

Short answer tests.  
Practical exercises.  
Assignments.

1.1 Successfully carry out exercises to determine the properties of air, and changes in the properties of air by the use of appropriate formulae, tables and charts.

### Learning outcome 2

#### Assessment criteria

Calculate the required plant capacity and airflow rates.

Practical exercises.  
Assignments.

2.1 Successfully out exercises to determine the required plant capacity and airflow rates of typical air conditioning applications using appropriate formulae, tables and charts.

### Learning outcome 3

#### Assessment criteria

Accurately plot a complex psychrometric process, analyse air side systems and determine system performance.

Practical exercises.  
Assignments.

## 7. Assessment Strategies

## 8. Module Delivery Strategies

## 9. Resource Requirements

- 3.1 Discuss and plot a wide range of complex psychrometric processes of air in air conditioning plant.
- 3.2 Analyse the process plotted and determine the performance of the plant at full and partial loads.

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, AIRAH, Design Aids.

ASHRAE, ASHRAE Handbook, HVAC Systems, Atlanta.

ASHRAE Psychrometric charts for other than NTP

Boyle, Australian Refrigeration and Air Conditioning, Trust Publications.

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

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

Eastop & McConkey, Applied Thermodynamics.

IHVE Handbooks

Jones, Air Conditioning Engineering.

---

## **10. Occupational health and safety requirements**

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

The Trane Company 1986. Trane Air Conditioning Manual.

Additionally further information may be sourced from Journal Articles.

Learners must be made aware of all relevant OH&S issues in all situations and are required to demonstrate safe working practices at all times.

All work areas must comply with current OH&S legislation.