

**1. Module details****Module name****Foundation Skills for the Electrotechnology Industry****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 76 – 80 hours.

**Module code**

NUE051

**Discipline code**

13020005

**2. Module purpose**

This module is intended to prepare students with skills necessary for entry into the electrotechnology industry and ensure a sound foundation for further education and training. The module covers how electricity is used and managed and the relationship between electrical/electronic wiring systems and building structures. In addition students will learn the purpose of common electrical accessories and cables, the basic skills and safety in using tools to work with electrical accessories and wiring system components.

**3. Prerequisites**

NUE052 Applied Electricity 1.

**4. Relationship to competency standards**

This module partly supports the achievement competency in units in the National Electrotechnology Competency Standards. Full competence is achieved through additional off-job and on-job training prescribed by the industry in Contract of Training

**5. Content****Generation, transmission and distribution of electricity.****Electrical distribution and use in building and premises.****Power and control plant and machinery.****Risks associated with electricity.****Overview of electronic systems.****Electronic cable types.****Electronic cable termination.****Electronic soldering practices.****Electrical systems arrangements to protect persons and property from the risks associated with electricity.****Safety procedures for working with electricity.**

**Features purpose of common accessories Fixing and installing accessories.**

**Fixing and installing accessories.**

**Cable types and common applications.**

**Terminating conductors.**

**Components of common wiring systems.**

**Criteria for selecting a wiring system and accessories.**

**Working with wiring system components.**

## 6. Assessment strategy

### Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met and students are well prepares for work placement. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests. Written tests should include, multiple choice, short answer and problem type items.

### Conditions of assessment

Normally learning and assessment will take place in a classroom simulated workplace environment.

## 7. Learning outcome details

### Learning outcome 1

**Describe how electricity is generated, transmitted and distributed in Australia.**

### Assessment criteria

- 1.1 Describe the main methods used to generating electricity in Australia.
- 1.2 Explain the terms, transmission, distribution and substation.
- 1.3 Describe the purpose of transmission and distribution transformers.
- 1.4 List the advantages of a three phase ac system of power generation and distribution.
- 1.5 Draw a single line schematic sketch of a simple power system showing typical generated transmission and distribution voltages.

**Learning outcome 2**

**Describe how electricity is distributed and used in building and premises.**

**Assessment criteria**

- 2.1 Identify the typical uses of electricity in building and premises.
- 2.2 Explain the terms consumer's mains, sub-mains', final sub-circuit, main switchboard and distribution board.
- 2.3 List the types of devices used to protect and control circuits and their typical located in an installation.
- 2.4 Draw a single line schematic sketch of a simple electrical installation.

**Learning outcome 3**

**Describe how electricity is used to power and control plant and machinery.**

**Assessment criteria**

- 3.1 Describe typical processes that require the use of plant and machinery.
- 3.2 Identify typical electrical appliances used to power industrial plants and machines.
- 3.3 Describe the purpose of electric motor starters.
- 3.4 Describes the purpose of basic transducers and control devices used in the operation of plant and machinery.
- 3.5 List the common types of electric motors and their typical application.

**Learning outcome 4**

**Describe the risks associated with electricity.**

**Assessment criteria**

- 4.1 List the effects of various level of current passing through the human body.
- 4.2 Explain the term live part.
- 4.3 Describe a situation in which a person may be at risk from direct contact with live parts.
- 4.4 Describe a situation in which a person may be at risk from indirect contact with live parts.
- 4.5 Describe a situation which a person or property may be at risk from the thermal effects of electric current.
- 4.6 Describe the terms overload and fault current.

**Learning outcome 5**

**Describe how electrical systems are arranged to protect persons and property from the risks associated with electricity.**

**Assessment criteria**

- 5.1 List the methods and means used in electrical systems to protect person from danger of:
  - contact with live parts
  - indirect contact with live parts.
- 5.2 List the methods and means used in electrical systems to protect persons against injury and property against damage from thermal effects of current under normal operating conditions.
- 5.3 List the methods and means used in electrical systems to protect persons against injury and property against damage from thermal effects of current or electromagnetic stresses under overload or fault conditions.

**Learning outcome 6**

**Demonstrate, under simulated conditions, the safety procedures to be followed when working with electricity.**

**Assessment criteria**

- 6.1 Identify the devices in an installation used to isolate a circuit from the supply.
- 6.2 Describe the testing procedures that must be used when safely isolating a circuit.
- 6.3 Show how an isolation device is locked - off and tagged to prevent closure.
- 6.4 Explain the purpose of work clearance systems and where they are used.

**Learning outcome 7**

**Describe the features purpose of common accessories.**

**Assessment criteria**

- 7.1 Define the term accessory.
- 7.2 Explain the purpose of common accessories.
- 7.3 List the main features of common accessories in terms of how they are dismantled and assembled, electrical safety design, electrical terminal types and likely limitation of use.

<b>Learning outcome 8</b>	<b>Demonstrate how a given accessory is fixed and installed.</b>
<b>Assessment criteria</b>	8.1 Identify typical locations where given accessories are installed.  8.2 Install accessories in given locations and on variety of surface structures.
<b>Learning outcome 9</b>	<b>Describe the features of various cable types and list sizes used for common applications.</b>
<b>Assessment criteria</b>	State the definitions for cable, cable core, armored cable, flexible cable, mineral insulated metal sheathed cable, neutral-screened cable and flexible cord.  Show with the aid of a diagram, the components of commonly used single insulated and sheathed cables and describe the functions of each.  List the common sizes of cables and the types of circuits in which they are used.
<b>Learning outcome 10</b>	<b>Demonstrate methods of terminating conductors in a various types of terminals.</b>
<b>Assessment criteria</b>	10.1 Select the appropriate tools for stripping cable insulation and sheaths, attaching cable lugs and connecting conductors to terminals.  10.2 Select a termination device for a given terminal.  10.3 Terminate conductor in a variety of terminal types in an approved manner.
<b>Learning outcome 11</b>	<b>List the features and purpose of the main components used in common wiring systems.</b>
<b>Assessment criteria</b>	11.1 List common types of cable enclosures and cable supports and typical applications of each.  11.2 Identify cable enclosures and cable supports and accessories from manufactures catalogue description and common trade terms.

<b>Learning outcome 12</b>	<b>List the criteria for selecting as wiring system and accessories.</b>
<b>Assessment criteria</b>	<p>12.1 List the factors to determine the minimum conductor size of a cable permitted to be used in a given installation.</p> <p>12.2 Suggest a wiring system suitable for installation in a building/premises of given structural design and finish.</p>
<b>Learning outcome 13</b>	<b>Demonstrate an ability to work with wiring system components.</b>
<b>Assessment criteria</b>	<p>13.1 Identify typical locations where given wiring system components are installed.</p> <p>13.2 Install wiring system components in given locations and on a variety of surface structures.</p>
<b>8. Delivery of the module</b>	
<b>Delivery strategy</b>	<p>Delivery strategies must be suitable for both theoretical and practical learning and address the module purpose. It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning outcome sequence other than that indicated in the body of the module. Also an integrated theory/practice approach should be used where students learn by experimentation and through practical application.</p>
<b>Resource requirements</b>	<p>Resources should be sufficient for students to carry out exercises on an individual basis. This will require a range of experimental circuit devices and measuring instruments, tools and wiring accessories.</p> <p>Trainers/teachers/facilitators must have qualifications in the relevant subject area they are engaged to deliver, recognized trainer and assessment training and at least five years relevant work experience.</p> <p>Useful references include:          Class notes          SAA Wiring Rules AS3000 (Sections 0 and 1)          Electrical Manufacturers and Suppliers catalogues.</p>
<b>Occupational health and safety requirements</b>	<p>A safe and healthy environment will be provided for students and teachers as well as safety procedure with regard to learning/teaching activity.</p>