

1. Module details**Module name****Mains Layout: Major Powerline 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

NUE237

Discipline code

0703130

2. Module purpose

This module is designed to provide the skills necessary to undertake the design of major overhead lines requiring detailed calculations.

3. Prerequisites

NUE232 Mains Layout: Overhead Mains Design.

4. Relationship to competency standards

This module addresses Unit 4.2 of the E.S.I. National Competency Standards for Overhead Line Work and Cable Jointing.

5. Content**Overhead conductors**

sizes

types

current ratings

Selecting conductors by length of span, conductor type, voltage, urban or rural

Calculations

stringing tables

mean equivalent span

conductor sag

tensions

Poles and positioning

servicing arrangements

alignments

other services

typographical features

statutory requirements

truncated corners

tee-offs

intersections

pole strength requirements

soil/foundations

Plotting conductor profiles

temperatures

spans

sag
 templates
 scaling
 clearances

Spanning limitation and design

insulators
 conductor vibration
 conductor blowout

Mains design software to determine

spanning limitations
 mechanical loads
 sags
 tensions
 conductor blowout
 conductor current ratings
 M.E.S.

6. Assessment strategy

Assessment methods

Short answer questions (written, oral or graphic or computer based), multiple choice questions, oral questions, observations, assignments, other recognised methods.
 Suitable practical exercises which assess the skills required of each learning outcome.

Conditions of assessment

Theory room for written tests together with practical field observation.

7. Learning outcome details

Learning outcome 1

Select suitable overhead conductors.

Assessment criteria

1.1 Select conductor sizes, types and current ratings for length of span and voltage drop in both urban and rural situations from standards codes of practice and work instructions to industry standard accuracy.

Learning outcome 2

Calculate mean equivalent span, conductor sag and nominate conductor stringing tensions.

Assessment criteria

- 2.1 Calculate mean equivalent span and conductor sag according to regulations codes of practice and work instructions to industry standard accuracy.
- 2.2 Calculate conductor stringing tensions for the mains design project in accordance with regulations, codes of practice and work instructions to industry standard accuracy.

Learning outcome 3

Profile a proposed overhead powerline, check ground clearances, inter-circuit clearances and uplift forces on poles.

Assessment criteria

- 3.1 Select pole positions for a mains project based upon data collected and recorded related to servicing arrangements, alignments, location of services, topographical features, and inconvenience to the public in accordance with regulations, codes of practice and work instructions to industry standard accuracy.

Learning outcome 4

Assessment criteria

- 4.1 Create 75°C, 15°C and 5°C conductor curves for long spans of mains (including supercircuit and subcircuit) overlaid on a ground profile to industry standard accuracy.

Note The 15 °C sage profile must be drawn by hand using the percentage span methods.

- 4.2 Determine the minimum ground clearances, intercircuit clearances and structure clearances in accordance with regulations, codes of practice and work instructions to industry standard accuracy.

Learning outcome 5

Verify spanning limitations, insulator requirements, anti-vibration requirements and conductor blowout.

Assessment criteria

- 5.1 Determine span and construction limitations and types of insulators to industry standard accuracy.
- 5.2 Determine conductor blowout and aeolian conductor vibration control in accordance with codes of practice and work instructions to industry standard accuracy.

Learning outcome 6	Use mains design software to review a design.
Assessment criteria	6.1 Determine spanning limitations, computer software. 6.2 Create an overhead power line design in accordance with standards, codes of practice, and work instructions using mains design computer software to industry standard accuracy.
8. Delivery of the module	
Delivery strategy	Delivery strategies must be suitable for both theoretical and/or practical learning and module purpose. It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning sequence other than indicated in the body of this module descriptor.
Resource requirements	Relevant Australian standards Enterprise work manuals and standing instructions, diagrams and layouts Relevant manufacturers' meter, equipment/component/instrument manuals.
Occupational health and safety requirements	Students should be made aware of Occupational Health and Safety issues in all situations and be expected to demonstrate safe working practices at all times. Electrical safety must be emphasised.