Unit Title:	Electrical Principles
Unit Level:	Three
Unit Credit Value:	3
Unit Code:	WNI572
Unit Type:	Academic Subject Content
Unit Review Date:	31/12/2028
Graded / Ungraded:	Graded

This unit has 6 learning outcomes:

Learning outcomes	Assessment criteria
The learner will:	**The learner can:**
1. Understand the structure of the atom in relation to electrical charge.	1.1 Describe the structure and the constituent parts of the atom. 1.2 Describe the polarity of charges and the charge of the electron. 1.3 Define the unit of electrical charge.
2. Know about the key variables in electrical circuits and appreciate the relationship between them.	2.1 Define potential difference, current and resistance and state the units of measurement for each. 2.2 Convert between multiples and submultiples of these units of measurement. 2.3 State and use Ohm's Law to solve a problem based on this equation. 2.4 Use a scientific calculator and simulation software in the manipulations and solution of a relevant problem.
3. Understand power and energy output in electrical circuits.	3.1 Derive and apply the formula for the power dissipated in a resistor. 3.2 Define electrical energy and relate this to the cost of electricity. 3.3 Solve a problem involving power and energy in an electrical circuit.

4. Understand the implications of different types of resistor networks in electrical and electronic circuits.	4.1 For resistors in series: Calculate total resistance, voltage across, power dissipated and use Ohm's Law to solve a problem involving a complex series circuit. 4.2 For resistors in parallel: Calculate total resistance, current through branches, power dissipated and use Ohm's Law to solve a problem involving a complex parallel circuit. 4.3 Explain the application of different resistor configurations in voltage, current and power division and limitation and solve a problem involving these principles. 4.4 Describe and demonstrate the use of the Wheatstone Bridge in a problem involving an electronic circuit. 4.5 Use simulation software to evaluate each type of resistor network, a problem involving the Wheatstone Bridge and a problem associated with potentiometers.
5. Understand resistance and resistivity.	5.1 State the formula for resistivity. 5.2 Describe the relationship between resistance and the length or area of a conductor. 5.3 Apply this knowledge to a practical electrical engineering problem.
6. Understand the principles of and know how to use electronic instruments.	6.1 Use the following instruments accurately in a practical environment: (a) Voltmeters (b) Ammeters (c) Ohmmeters (d) Multimeters (e) Oscilloscopes (f) signal generators (g) digital multimeters (h) power supplies 6.2 Explain the theory behind shunts and multipliers in meter design. 6.3 Select correctly and use these instruments to measure a signal.

	6.4 Use simulation software to design instruments and use them to evaluate circuits.

Assessment (Graded)

1. Meets assessment criteria	At least a Pass
2. Further grading	
▪ Meets assessment criteria but not merit grading standards	Pass
▪ Meets assessment criteria and merit but not distinction grading standards	Merit
▪ Meets assessment criteria and distinction grading standards	Distinction