

Module Title:	Principles of Electricity
Language of Instruction:	English
Credits:	10
NFQ Level:	6
Module Delivered In	No Programmes
Teaching & Learning Strategies:	(a) Teaching will be conducted using lectures, tutorials and practicals. (b) The Institute MLE will be used to evaluate the students understanding of the basic concepts during each section using multiple-choice questions. (c) At the end of each section, self-test question sheets will be issued to the students. Any difficulties arising from the self-test question sheets will be addressed during the following tutorial. (d) At various stages of the module students will be directed to certain websites and will have to research certain topics (given exact research criteria). These topics will form the basis of discussion in a tutorial session. (e) The practical sessions will be used to back up the theory.
Module Aim:	To give the students an understanding of the concept of an electric circuit and its associated parameters. To develop their ability to analyse the behaviour of electric circuits, to apply circuit theorems to simplify basic electric circuits and to analyse basic electromagnetic circuits.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Demonstrate an understanding of electricity and magnetism
LO2	Describe the properties and operation of common electronic and magnetic components
LO3	Design and analyse basic electric circuits using circuit laws
LO4	Using schematic diagrams, build and take accurate measurements in multimode circuits
Pre-requisite learning	
Module Recommendations	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

Quantities and Units

Units of Measurement. Scientific Notation. Engineering Notation and Metric Prefixes. Metric Unit Conversions

Voltage, Current and Resistance

Atomic Structure. Electrical Charge. Voltage, Current, and Resistance. Voltage and Current Sources. Resistors. The Electric Circuit. Basic Circuit Measurements. Electrical Safety. A Circuit Application.

Ohm's Law

The Relationship of Current, Voltage, and Resistance. Calculating Current. Calculating Voltage. Calculating Resistance. Introduction to Troubleshooting.

Energy and Power

Power in an Electric Circuit. Resistor Power Ratings. Energy Conversion and Voltage Drop in Resistance. Power Supplies.

Series Circuits

Resistors in Series. Current in a Series Circuit. Total Series Resistance. Application of Ohm's Law. Voltage Sources in Series. Kirchhoff's Voltage Law. Voltage dividers. Power in Series Circuits. Voltage Measurements. Troubleshooting.

Parallel Circuits

Resistors in Parallel. Voltage in a Parallel Circuit. Kirchhoff's Current Law. Total Parallel Resistance. Application of Ohm's Law. Current Sources in Parallel. Current Dividers. Power in Parallel Circuits. Parallel Circuit Applications. Troubleshooting. A Circuit Application.

Series-Parallel Circuits

Identifying Series-Parallel Relationships. Analysis of Series-Parallel Resistive Circuits. Voltage Dividers with Resistive Loads. Loading Effect of a Voltmeter. Ladder Networks. The Wheatstone Bridge. Troubleshooting.

Circuit Theorems and Conversions

The DC Voltage Source. The Current Source. Source Conversions. The Superposition Theorem. Thevenin's Theorem. Maximum Power Transfer Theorem. Delta-to-Wye (Δ -to -Y) and Wye-to-Delta (Y-to- Δ) Conversions.

Branch, Loop, and Node Analyses

Simultaneous Equations in Circuit Analysis. Branch Current Method. Loop Current Method. Node Voltage Method.

Magnetism and Electromagnetism

The Magnetic Field. Electromagnetism. Electromagnetic Devices. Magnetic Hysteresis. Electromagnetic Induction. Applications of Electromagnetic Induction.

Introduction to Alternating Current and Voltage

The Sinusoidal Waveform. Sinusoidal Voltage Sources. Sinusoidal Voltage and Current Values. Angular Measurement of a Sine Wave. The Sine Wave Formula. Introduction to Phasors. Analysis of AC Circuits. Superimposed DC and AC Voltages. Nonsinusoidal Waveforms. The Oscilloscope.

Capacitors

The Basic Capacitor. Types of Capacitors. Series Capacitors. Parallel Capacitors. Capacitors in DC Circuits. Capacitors in AC Circuits. Capacitor Applications. Sinusoidal Response of Series RC Circuits. Impedance of Series RC Circuits. Analysis of Series RC Circuits.

Assessment Breakdown

Assessment Breakdown	%
Continuous Assessment	20.00%
Practical	20.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Students will complete assignments which will be allocated either as homework or during class	1,2,3	20.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	The student will complete practical assignments during the module and write a report on each assignment.	1,3,4	10.00	End-of-Semester
Practical/Skills Evaluation	The student will complete 2 practical tests during the module; a maximum of 5% will be awarded for each practical test.	1,3,4	10.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	The written examination, at the end of the module, will evaluate the extent of the student's knowledge of the learning outcomes	1,2,3	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	2.00
Lecture	Every Week	1.00
Practicals	Every Week	2.00
Independent Learning	Every Week	2.00
Total Hours		7.00

