

Title:	Electrical Science - DC Theory APPROVED
Long Title:	Electrical Science - DC Theory
Module Code:	ELEC6018
Credits:	5
NFQ Level:	Fundamental
Field of Study:	Electrical Engineering
Valid From:	Semester 1 - 2014/15 (September 2014)
Module Delivered in	3 programme(s)
Module Coordinator:	JOSEPH CONNELL
Module Author:	NOEL MULCAHY
Module Description:	In this module students will describe and define basic SI units and quantities. This module introduces basic resistive, capacitive and inductive circuits. The application of formulae and analysis techniques to these circuits is explored.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	describe and define electrical, magnetic and physical terms and quantities and perform fundamental calculations involving these quantities.
LO2	apply DC theory to the solution of practical problems involving electrical quantities.
LO3	select appropriate electrical and electronic components based on their characteristics and construct basic circuits utilising these components.
LO4	build and construct basic series and parallel circuits in a electrically safe manner.
LO5	measure parameters within basic circuits to examine circuit/component behaviour
Pre-requisite learning	
Module Recommendations	
<i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</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. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</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. You may not enrol on this module if you have not acquired the learning specified in this section.</i>	
No requirements listed	
Co-requisites	
No Co Requisites listed	

Module Content & Assessment

Indicative Content

Fundamentals

SI system, prefixes, scientific & engineering notation; Introduction to current flow; electrical units. Conductors, insulators, resistivity, temperature coefficient of resistance. Ohm's Law; Kirchhoff's Laws; DC network solutions.

Electrostatics

Capacitance, capacitors, energy stored. Electric fields. Electrostatic charges; field strength; flux density; permittivity; dielectric strength. Electrostatic shielding.

Magnetism and Electromagnetism

Magnetic fields. Ferromagnetism; hysteresis loops; saturation. Electromagnetism; fields; magnetomotive force; magnetic flux, electromagnetic devices. Electromagnetic induction; Lenz's Law and transformers. Magnetic screening. Force on current-carrying conductors in magnetic field; application to motors.

Thermal Energy

Heat and energy - heat capacity, calorific value, change of state and Latent Heat. Transfer of heat - conduction, convection and radiation.

Practical exploration of Basic Electrical Circuits

Electrical safety, Circuit Connections. Ohm's Law - series, parallel and series parallel resistors networks. Kirchhoff's Current and Voltage Laws. Application of Kirchhoff's Laws with two sources.

Assessment Breakdown	%
Course Work	50.00%
End of Module Formal Examination	50.00%

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	Mid term examination	1,2,3	20.0	Week 7
Practical/Skills Evaluation	Lab	1,2,3,4,5	30.0	Every Week

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,2,3	50.0	End-of-Semester

Reassessment Requirement

Repeat examination

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Lecture on DC Theory and Science	2.0	Every Week	2.00
Lab	Weekly assessment of practical competency through laboratory-based assignments with reports.	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Re-visit notes and solve problems set	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

This module has no Part Time workload.

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> • John Bird 2010, <i>Electrical Circuit Theory and Technology</i>, 4th Ed., Routledge [ISBN: 978-1856177702]
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> • Edward Hughes, Dr John Hiley et al 2012, <i>Electrical & Electronic Technology</i>, 11th Ed., Pearson [ISBN: 978-0273755104] • Christopher R. Robertson, <i>Fundamental electrical and electronic principles</i>, 3rd Ed., Newnes [ISBN: 978-0750687379] • Christopher R. Robertson 2008, <i>Further electrical and electronic principles</i>, 3rd Ed., Newnes Oxford [ISBN: 978-0750687478]
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<u>Bachelor of Engineering (Honours) in Electrical Engineering</u>	1	Mandatory
CR_EELEC_7	<u>Bachelor of Engineering in Electrical Engineering</u>	1	Mandatory
CR_EELEC_6	<u>Higher Certificate in Engineering in Electrical Engineering</u>	1	Mandatory