



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

ELTR6009: Electrical Science 1

Module Details

Short Title:	Electrical Science 1 APPROVED		
Full Title:	Electrical Science and Circuits 1		
Module Id:	2842		
Official Code:	ELTR6009	NFQ Level:	6
		ECTS Credits:	5

Coordinator:	JOSEPH CONNELL
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Description:	This module introduces the basic scientific principles which underpin electronic engineering and progresses to the design, measurement and analysis of resistive circuits with DC sources. The conversion of electrical energy into other domains is examined.
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Learning Outcomes:

On successful completion of this module the learner will be able to...

1. Describe atomic structure and bonding and how this determines the electrical properties of materials.
2. Distinguish basic electrical units such as charge, current, voltage, resistance, power and energy.
3. Design and construct resistor circuits and measure their performance.
4. Calculate the efficiency of electrical energy conversion and identify energy loss mechanisms.
5. Use simulation software and circuit analysis principles to calculate currents, voltages and power in resistive circuits.

Pre-requisite learning

Module Recommendations

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).

No recommendations listed

Incompatible Modules

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.

No incompatible modules listed

Module Requirements

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.

No requirements listed



Module Content & Assessment

Indicative Content

Fundamentals

SI system, prefixes, scientific & engineering notation; Introduction to circuits, current flow and units for charge, current, voltage, energy and power.

Material properties

Conductors, insulators, resistivity, temperature coefficient of resistance and application as a sensor.

DC circuit theory

Resistor networks, Ohm's Law, Kirchhoff's Laws, voltage/current dividers, node and mesh analysis.

Thermal energy

Heat capacity, transfer of heat - conduction, convection and radiation, conversion of electrical energy to heat energy.

Light and sound

Generation and detection of light and audio waves in electronics. Wave properties and applications in electronics.

Instrumentation

Use of batteries, power supplies, digital multimeter and datalogging equipment.

Simulation software

Schematic capture, netlist generation and DC circuit simulation using SPICE.

Laboratory programme

Good Lab. Practice and Safety, Circuit measurements, Ohm's Law, Resistivity measurement, Battery Capacity Test, Series Resistors, Parallel resistors, Comparison of LED/ Light Bulb efficiency, Kirchhoff's Laws, Mesh and node circuit analysis I, Mesh and node circuit analysis II

Assessment Breakdown	%
Course Work	40%
End of Semester Formal Examination	60%

	Outcome addressed	% of total	Assessment Date
Formal End-of-Semester Examination	1,2,3,4,5	60%	Semester End

Coursework Breakdown				
Type	Description	Outcome addressed	% of total	Assessment Date
Project	Power source evaluation	2,3,4	10	Week 5
Project	Electric light source comparison	1,2,3,4,5	10	Week 9
Practical/Skills Evaluation	Laboratory performance and reports	1,2,3,4,5	20	Every Week

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



Module Workload & Resources

Workload		Full-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Class instruction	2	Every Week	2.00
Lab	Practical work and instruction	3	Every Week	3.00
Independent & Directed Learning (Non-contact)	Study and project work	2	Every Week	2.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				5.00

Workload		Part-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	No Description	2	Every Week	2.00
Lab	Practical training	2	Every Week	2.00
Independent & Directed Learning (Non-contact)	No Description	3	Every Week	3.00
Total Weekly Learner Workload				7.00

Resources	
<i>Recommended Book Resources</i>	
• Boylestad 2003, <i>Introductory circuit analysis</i>, 10th. Ed., Prentice-Hall [ISBN: 013097147X]	
<i>Supplementary Book Resources</i>	
• Floyd 2002, <i>Principles of Electric Circuits</i>, 6th. Ed., Prentice-Hall [ISBN: 013028484X] • Boylestad, Kousourou 2003, <i>Experiments in circuit analysis</i>, 9th. Ed., Prentice-Hall [ISBN: 0130144894] • Serway, Jewett 2003, <i>Physics for scientists and engineers</i>, 6th. Ed., Brooks/Cole [ISBN: 0534408427]	
<i>Other Resources</i>	
• Website: <i>How Stuff Works</i> http://www.howstuffworks.com • Website: <i>Online encyclopedia</i> http://www.wikipedia.com	