



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

ELTR6010: Electrical Science 2

Module Details

Short Title:	Electrical Science 2 APPROVED		
Full Title:	Electrical Science and Circuits 2		
Module Id:	2843		
Official Code:	ELTR6010	NFQ Level:	6
		ECTS Credits:	5
Coordinator:	JOSEPH CONNELL		
Description:	The student will study the performance of circuits with voltage and current varying as a function of time. These include switched DC circuits with capacitors and inductors and AC circuits with resistance, capacitance and inductance.		
Learning Outcomes:			
On successful completion of this module the learner will be able to...			
1. Describe capacitor construction, charge and voltage relationship, capacitor networks and capacitor charging and discharging in RC circuits. 2. Estimate the magnetic field due to current flow and relate this to the operation of inductors. 3. Analyse the performance of basic electrical machines. 4. Use simulation software and impedance analysis principles to predict currents, voltages, power factor and phase in AC circuits with resistive and reactive components. 5. Use oscilloscopes, function generators and discrete components to measure reactive and resistive/reactive circuit performance and confirm predicted operation.			
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.			
Electrical Science and Circuits I			



Module Content & Assessment

Indicative Content

• Capacitor circuits

Capacitor construction, charge, voltage, energy stored, series and parallel capacitors, RC time constant. Capacitors in electronic applications.

• Electromagnetism and inductors

Concepts of magnetic field, strength, permeability and flux. Magnetic materials. Faraday's and Lenz's laws. Inductor construction, voltage, current and energy storage. RL time constant.

• Electrical machines

Electromagnetic forces and the operation of DC and AC motor. AC power generation. Operation of a transformer. Application in a power supply and the national grid.

• AC fundamentals

Sine wave properties, phasors, real and reactive power.

• AC circuit analysis

Concept of reactance, impedance and phase lag. Power in AC circuits. Basic phasor analysis and power factor.

• Laboratory programme

Energy storage in a capacitor, Oscilloscope measurements, RC time constant measurement, Capacitors in series, Capacitors in parallel, RC filters, Electromagnetism, Series and parallel inductors, DC motor operation, Transformer construction and operation, Power factor measurements, AC and DC power in a light bulb.

Assessment Breakdown

	%
Course Work	100%
End of Semester Formal Examination	0%

Coursework Breakdown

Type	Description	Outcome addressed	% of total	Assessment Date
Written Report	Assignment on component evaluation	1,2	15	Week 6
Project	Transient/dynamic circuit design and simulation	1,2,4,5	15	Week 9
Open-book Examination	Assessment of understanding and analysis	1,2,3,4,5	50	Week 12
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



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Module Workload & Resources

Workload		Full-time mode		
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Class instruction	3	Every Week	3.00
Lab	Laboratory experiments and instruction	2	Every Week	2.00
Independent & Directed Learning (Non-contact)	Material review and projects	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

Recommended Book Resources

- **Boylestad 2003, *Introductory circuit analysis*, 10th. Ed., Prentice-Hall [ISBN: 013097147X]**

Supplementary Book Resources

- **Floyd 2002, *Principles of Electric Circuits*, 6th. Ed., Prentice-Hall [ISBN: 013028484X]**
- **Boylestad, Kousourou 2000, *Experiments in circuit analysis*, 9th. Ed., Prentice-Hall [ISBN: 0130144894]**
- **Serway, Jewett, 2003, *Physics for Scientists and Engineers*, 6th. Ed., Brooks/Cole [ISBN: 0534408427]**

Other Resources

- **Website: *How Stuff works***
<http://www.howstuffworks.com>
- **Website: *On-line encyclopedia***
<http://www.wikipedia.com>