

<b>Module Code</b>	EEU11E06
<b>Module Name</b>	Electrical Engineering
<b>ECTS Weighting<sup>1</sup></b>	5 ECTS
<b>Semester taught</b>	Semester 2
<b>Module Coordinator/s</b>	Associate Professor Naomi Harte

**Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline**

On successful completion of this module, students should be able to:

- LO1. Explain the fundamental concepts of electricity and magnetism and their importance.
- LO2. Apply fundamental circuit theory and laws to dc resistive circuits.
- LO3. Analyse the operation of simple circuits in RC and RL combinations.
- LO4. Convert between binary and decimal representations and carry out binary addition, subtraction and multiplication.
- LO5. Manipulate Boolean expressions so as to minimise the number of literals using algebra or Karnaugh maps.
- LO6. Design standard and iterative combinational logic circuits.
- LO7. Evaluate the complexity and speed of combinational designs.
- LO8. Report experimental findings from a laboratory in a clear, concise and communicative manner, interpreting the findings.

Students are expected to be self-motivated and take joint responsibility for their learning, and demonstrate this through reading and engaging with the additional course material referenced throughout the course. The course covers foundational material essential to all branches of engineering.

**Graduate Attributes: levels of attainment**

- To act responsibly - Attained
- To think independently - Attained
- To develop continuously - Introduced
- To communicate effectively - Enhanced

## Module Content

### *Simple DC circuits*

- Resistors in series and parallel; Kirchhoff's voltage and current laws; power dissipation; the ideal voltage source and current source; maximum power transfer; the ideal capacitor, permittivity; the multi-plate capacitor, variable capacitor; capacitor charging and discharging, current-voltage relationship, time-constant, rise-time, fall-time; inductor energisation and de-energisation, inductance current-voltage relationship, time-constant

### *Electromagnetism*

- Electromagnetic induction, Fundamental relations, Faraday's law, Lenz's Law, simple applications: solenoids and relays

### *Digital Systems and Binary Numbers*

- Digital signals and systems
- Number systems
- Positive/negative representation
- Binary arithmetic

### *Boolean Algebra*

- Definitions and basic theorems
- Algebraic simplification
- Sum of products and product of sums formulations
- Gate primitives
- Karnaugh maps

### *Combinational Logic*

- Combinational design
- Assessment of complexity and speed
- Code converters, multiplexors, decoders
- Addition circuits, priority encoder

## Teaching and Learning Methods

The module is taught using a combination of lectures, tutorials and one supporting laboratories. The tutorials will develop students problem-solving skills by tackling problems based on the lecture material. Students are expected to attempt tutorial questions in advance of attending tutorial sessions. Students should use the course texts to supplement their problem solving practice.

<b>Assessment Details<sup>2</sup></b> <b>Please include the following:</b> <ul style="list-style-type: none"> <li>• <b>Assessment Component</b></li> <li>• <b>Assessment description</b></li> <li>• <b>Learning Outcome(s) addressed</b></li> <li>• <b>% of total</b></li> <li>• <b>Assessment due date</b></li> </ul>	<table border="1"> <thead> <tr> <th>Assessment Component</th> <th>Assessment Description</th> <th>LO Addressed</th> <th>% of total</th> <th>Week due</th> </tr> </thead> <tbody> <tr> <td>Lab</td> <td>DC Circuits Laboratory</td> <td>1,2,8</td> <td>7</td> <td>2 weeks after taken</td> </tr> <tr> <td>Class tests</td> <td>MCQ exams</td> <td>1-7</td> <td>8</td> <td>Week 6, Week 12</td> </tr> <tr> <td>Exam</td> <td>End of year Exam</td> <td>All</td> <td>85</td> <td>As per timetable</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Assessment Component	Assessment Description	LO Addressed	% of total	Week due	Lab	DC Circuits Laboratory	1,2,8	7	2 weeks after taken	Class tests	MCQ exams	1-7	8	Week 6, Week 12	Exam	End of year Exam	All	85	As per timetable					
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<b>Reassessment Requirements</b>	100% Exam based																									
<b>Contact Hours and Indicative Student Workload<sup>2</sup></b>	<p><b>Contact hours:</b> 45 (33hr Lecture, 10hr Tutorial, 2hr Lab)</p> <hr/> <p><b>Independent Study (preparation for course and review of materials):</b> 2hr Lab prep, 2 hour lab write-up [4] 3 hrs/week to review lectures and attempt tutorials in advance [33]</p> <hr/> <p><b>Independent Study (preparation for assessment, incl. completion of assessment):</b> 4 hr additional study in advance of class tests [8] Exam Preparation 10-25 hours</p>																									
<b>Recommended Reading List</b>	<p>Electrical and Electronic Technology, Hughes, 9th edition, Pearson, Prentice-Hall, 2005</p> <p>Digital Design, 5th edition, MM Mano and MD Ciletti, Pearson, Prentice Hall, 2013</p> <p>Videos and links as given in lectures</p>																									
<b>Module Pre-requisite</b>	Leaving Cert Honours Mathematics (or equivalent)																									

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<b>Module Co-requisite</b>	
<b>Module Website</b>	On Blackboard
<b>Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.</b>	No
<b>Module Approval Date</b>	
<b>Approved by</b>	
<b>Academic Start Year</b>	September 9 <sup>th</sup> 2019
<b>Academic Year of Date</b>	2019/20120