

<b>Module Title:</b>	Digital Electronic Systems
<b>Language of Instruction:</b>	English
<b>Credits:</b>	10
<b>NFQ Level:</b>	6
<b>Module Delivered In</b>	No Programmes
<b>Teaching &amp; Learning Strategies:</b>	(a) A combination of lectures, class discussion, tutorials, practicals and demonstrations will be used. (b) Particular emphasis will be placed on active learning including problem/project based learning
<b>Module Aim:</b>	To introduce students to the fundamentals of digital electronic systems and microprocessor hardware
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Describe the operation of, and analyze using Boolean algebra techniques, combinational and sequential components and circuits
LO2	Explain the operation of a microprocessor-based system including operation of bus, memory and input/output.
LO3	Design and implement significant combinatorial digital circuits using conventional gates and logic components.
LO4	Analyse a problem scenario leading to the design and implementation of a digital logic based solution using appropriate techniques.
LO5	Demonstrate the ability to work effectively in a group, undertaking personal, administrative and organisational activities associated with an efficient team.
<b>Pre-requisite learning</b>	
<b>Module Recommendations</b>	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b>	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b>	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
"Introduction to Electronics" (section 9.1.1) or equivalent; "Principles of Electricity" (section 9.1.2) or equivalent; "Mathematics 1" (section 0.1.5 or equivalent	

## Module Content & Assessment

Indicative Content
<b>Logic Gates</b> CMOS and TTL logic gates. Gate minimization using Karnaugh maps and Boolean Algebra
<b>Number Systems</b> Numbers Systems including 2's complement, floating point.
<b>Multivibrators</b> Bi Stable, Astable and monostable Multivibrators at gate level and using a 555 timer
<b>Sequential logic design</b> Sequential logic - counters, state machines etc
<b>Assembly code</b> Introduction to assembly code instructions.
<b>Memory</b> Semiconductor memory
<b>Embedded C</b> Introduction to Embedded C for microcontrollers.
<b>Timing Considerations</b> Static Timing analysis for small gate level designs.
<b>Microprocessors</b> Microprocessor architecture
<b>Memory Addressing</b> Memory Addressing
<b>Semiconductor memory</b> SRAM, DRAM, ROM and FLASH
<b>Displays</b> LCD, CRT and Plasma technologies

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 be assigned a number of assignments as part of the assessment of this module. Students may be asked to complete assignments during tutorials or as homework	1,2,3,4,5	20.00	n/a

No Project

Practical				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Students will complete practical assignments during the course of the module. Students will be required to maintain a laboratory logbook and write a brief report on each assignment. A project based learning approach will be used; hence some assignments may take several weeks to complete.	1,3,4	10.00	n/a
Practical/Skills Evaluation	Each student will complete two formal practical tests. A mark of up to 5% of the overall mark will be assigned for each test.	1,3	10.00	n/a

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A final written examination will assess the learning outcomes to the full extent	1,2,3	60.00	End-of-Semester

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	2.00
Practicals	Every Week	2.00
Tutorial	Every Week	1.00
Total Hours		5.00

