

Digital Systems 1

EE103

5 ECTS Credits

Module Name	Digital Systems 1
Module Code	EE103
Module Co-ordinator	Refer to Excel document <i>Module_Co-ordinators</i>
Department	Electronic Engineering
Credit rating	5 ECTS Credits
Pre-requisites	None

Aims	<ul style="list-style-type: none"> • To introduce students to the world of digital design. • To equip students with the necessary skills to tackle real-world problems in the design of complex digital systems.
Learning Outcomes	<p>At the end of this module, the student will be able to:</p> <ol style="list-style-type: none"> 1. Conduct basic arithmetic with binary numbers. 2. Perform Boolean algebra. 3. Minimise logic using Karnaugh Maps. 4. Implement a logic circuit using only NAND / NOR gates. 5. Describe the operation of basic flip-flops. 6. Design a synchronous counter. 7. Distinguish between different programmable logic devices.

Time Allowance for Constituent Elements	
Lectures / Tutorials	34 hours
Class tests (2 x 1 hr)	2 hours
Laboratory (4 x 3 hr)	12 hours
Independent study	75 hours
Semester examination	2 hours

Indicative Syllabus

- Binary numbers – the currency of computers
- Binary representations – sign and magnitude, two's complement, BCD
- Binary arithmetic – addition, subtraction, multiplication
- Boolean functions and Boolean minimisation
- Minimisation using Karnaugh maps (up to and including 5-variables)
- Implementation using NAND and NOR functions
- Sequential Logic – SR, D, JK, T and Master-slave flipflops
- Counters
- Registers
- Programmable Logic Devices
 - Programmable Array Logic (PAL)
 - Programmable Logic Arrays (PLA)
 - Read Only Memory (ROM)

Assessment Criteria

Semester examination	70%
Laboratory reports (4)	10%
Class tests (2)	20%

Penalties: Missed labs and class tests cannot be repeated, in general.

Pass Standard and any Special Requirements for Passing Modules: The Pass Mark is 40% - students are not required to pass the written and continuous components separately.

Supplemental Examination: 1 x 2 hour written examination (Autumn). The continuous assessment mark is carried forward as there is no facility for repeating the continuous assessment elements of the course.

Assessment Philosophy

The final examination and class tests are designed to assess all learning outcomes. All questions in all class tests are compulsory, while the examination paper has a compulsory question that covers all aspects of the syllabus. The laboratory covers learning outcomes 3 - 7 and also encourages teamwork.

Course Text	<ul style="list-style-type: none"> • Mano, M. Morris, <i>Digital design</i>, (2nd ed.), Prentice-Hall, 1991.
References	<ul style="list-style-type: none"> • Floyd, Thomas L., <i>Digital fundamentals</i>, (7th ed.), Prentice Hall, 1999. • Carter, John W. <i>Digital Designing with Programmable Logic Devices</i>, Prentice Hall, 1997. • Wakerly, John F. <i>Digital Design: Principles and Practices</i> (3rd ed.), Prentice Hall, 2001.

Programmes currently utilising module	Compulsory
BE in Electronic Engineering	Yes
BSc in Robotics and Intelligent Devices	Yes