

Digital Systems 2

EE209

5 ECTS Credits

Module Name	Digital Systems 2
Module Code	EE209
Module Co-ordinator	Refer to Excel document <i>Module_Co-ordinators</i>
Department	Electronic Engineering
Credit rating	5 ETCS credits
Pre-requisites	EE103 Digital Systems 1

Aims	<ul style="list-style-type: none"> To develop the students' understanding of digital systems principals and design methods.
Learning Outcomes	<p>At the end of this module a student should be able to:</p> <ol style="list-style-type: none"> 1. Perform calculations using different number systems. 2. Distinguish between different error control codes. 3. Design combinational logic circuits using multiplexers as universal logic modules. 4. Analyse and design Finite State Machines. 5. Outline the key features of memory and storage devices (RAM, ROM etc.). 6. Explain the basic operation of Analogue to Digital and Digital to Analogue converters. 7. Outline the difference between CPUs and FPGAs. 8. Explain the function of both CPUs and FPGAs.

Time Allowance for Constituent Elements	
Lectures	24 hours
Tutorials	11 hours
Class test	1 hour
Laboratory (5 x 3hr)	15 hours
Independent study	72 hours

Semester Examination	2 hours
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Indicative Syllabus
<ul style="list-style-type: none"> • Error control codes • Combinational logic with MSI and LSI • Sequential logic design - Flip-flops. • Programmable logic • Finite state machines (Mealy and Moore machines); Analysis. Design of minimal equivalent machines through state reduction. Analysis of invalid states. • Memory (ROM and RAM) and storage devices. SRAM and DRAM timing. • Analogue to Digital and Digital to Analogue converters. Nyquist rate converters. Non-ideal behaviour. • Multiplexers. Combinational logic design using Multiplexers as Universal Logic Modules • Introduction to FPGA technology - RTL level, comparison with Embedded processors/CPUs

Assessment Criteria	
Semester examination	70%
Laboratory (5)	20%
Class test	10%
<p>Penalties: Missed labs and class tests cannot be repeated, in general.</p> <p>Pass Standard and any Special Requirements for Passing Modules: Pass 40% - students are not required to pass the written and continuous components separately – an overall pass mark of 40% is acceptable</p> <p>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.</p>	

Assessment Philosophy

The final examination and the class test are designed to assess all learning outcomes 1 – 8. All questions in the class test are compulsory. The laboratories cover learning outcomes 2 – 4 and also encourage teamwork.

Course Text	Floyd, Thomas L., <i>Digital fundamentals</i> , (7th ed.), Prentice Hall, 1999.
References	Mano, M. Morris, <i>Digital design</i> , (2nd ed.), Prentice-Hall, 1991. 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