

**DIGITAL ELECTRONICS 2**

Course code	7LTV
GU Credits	10
ECTS Credits	5
Prerequisite course(s)	Electronics and Electrical Engineering 1 (3KAU)
Teaching staff (first named has overall responsibility for the course)	Dr D Muir (telephone 5241; email D.Muir)
Approximate size of class	60 students
Semester	1

**Description of course****1. Digital Electronics**

20 lectures and 5 tutorials

***Aims***

To analyse and design simple combinational and sequential digital logic systems.

***Objectives******Understanding***

Design of basic finite state machines. Use of MSI logic. Relationships between state diagrams and state tables. The implementation of logical systems and controllers using Programmable Logic Devices.

***Knowledge***

Function and uses of various MSI logic functions e.g. multiplexers, decoders, registers and counters. Architectures of simple programmable logic devices. General structure of synchronous sequential systems. Attributes and features of various logic families. Form of state transition tables and state diagrams. Basic VHDL.

***Skills***

The writing of VHDL to implement combinational and sequential logic functions. Programming PLDs. Analysis and design of synchronous sequential systems. Design of circuits using MSI devices.

***Syllabus***

Revision of basic logic functions, simplification of expressions, Karnaugh maps, flip flops, simple sequential systems. Use of Logic Simulator. MSI functions: multiplexers, decoders, registers and counters. Architecture of programmable logic devices. Basic statements, entities and architectures in VHDL leading to simulation and then implementation on devices. Design of synchronous sequential logic systems; state diagrams and tables. Fan-out, propagation delay, speed, and power consumption of logic families.

**2. Laboratory**

4 sessions of 2 hours each

***Aims***

To reinforce theoretical material taught in lectures. To gain skills in using industry standard software tools for design and implementation of logic circuits.

**Objectives***Understanding*

Design techniques for digital circuits.

*Knowledge*

Design and simulation software packages. The use of conventional instrumentation to observe and measure system behaviour. Good laboratory practice.

*Skills*

Use of logic simulator, compiler and implementation software packages. Programming of simple programmable logic devices.

**Recommended books**

<b>Authors</b>	<b>Title, edition</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>	<b>Cost</b>	<b>Code</b>
A S Sedra and K C Smith	Microelectronic Circuits (4 <sup>th</sup> ed)	Oxford	1997	0195116909	£23	C
M Morris Mano	Digital Design	Prentice Hall	1991	0132129949	£22	C
J F Wakerly	Digital Design	Prentice Hall	2000	0130825999	£37	C

Codes : A = compulsory; B = strongly recommended; C = recommended; D = wider reading

**Study times**

<b>Type</b>	<b>Details</b>
Lectures and tutorials	25 hours
Laboratories	10 hours
Tutorial Sheets	20 hours
Review and consolidation of course material	30 hours
Final revision and examination	15 hours

These times are an estimate of the work required by a typical student. There will be variations between individuals, but you will run the risk of failure if you spend significantly less time on this course than these guidelines suggest.

**Components of assessment**

<b>%</b>	<b>Type</b>	<b>Details</b>
10	Course work	Laboratory
90	Degree Examination	90 minute paper; all questions compulsory

The degree examinations are held around week 13; a resit is available in August/September.