The University Of Sheffield.

EEE336 DIGITAL DESIGN

Credits: 10

Course Description including Aims

The aim of this module is to provide students with a fundamental understanding of synchronous digital systems. This is done in conjunction with the Verilog Hardware Description Language (HDL) and particular emphasis is placed on the architecture and organisation of a basic microprocessor.

1. To introduce the Verilog HDL and gain a working knowledge of its application to the modeling, simulation and synthesis of digital systems.
2. To develop a solid understanding of synchronous digital systems with an awareness of performance limitations and implementation issues.
3. To obtain detailed knowledge of the architecture and organisation of a basic microprocessor and its peripheral interfaces.

Outline Syllabus

Verilog HDL: syntax, simulation, synthesis, digital building blocks, finite state machines. **Microprocessors:** Instruction Set Architecture (ISA), functional behaviour, internal organisation. **Peripherals:** memory hierarchy, memory cycles, Direct Memory Access (DMA), I/O devices. **Operations:** arithmetic, floating point representation, addressing modes, stacks, interrupts. **Processor Architecture:** ALU, registers, data path design, RISC, CISC. **Processor Control:** Hardwired, microprogrammed. **Microcontrollers & DSP:** Architecture, practical examples.

Time Allocation

24 lectures, 12 problem classes, 64 hours guided independent study.

Recommended Previous Courses

EEE119, EEE225.

Assessment

2 hour examination, answer 3 questions out of 4

Recommended Books

Mano & Kime	Logic and Computer Design Fundamentals, 4/E	Prentice-Hall
Gajski, D D	Principles of Digital Design	Prentice-Hall
Ciletti, M D	Advanced Digital Design with the Verilog HDL 2/E	Prentice-Hall
Floyd, T L	Digital Fundamentals	Prentice-Hall

Objectives

On completion of this module successful students will be able to

1. Analyse a synchronous digital system described schematically or in Verilog.
2. Design a small synchronous digital system.
3. Be aware of implementation issues and factors that limit performance.
4. Understand and explain the basic structure and operation of a digital computer.
5. Identify and describe the functional requirements of a (micro) processor and peripherals.
6. Understand and explain the internal organisation of different types of processors.