

COMPUTER ARCHITECTURE 2

Course code	7MAV
GU Credits	10
ECTS Credits	5
Prerequisite courses	Electronics and Electrical Engineering 1 (3KAU)
Teaching staff (first named has overall responsibility for the course)	Dr M. Macauley (telephone 4791; email M.Macauley)
Approximate size of class	90 students
Semester	1

Description of course**1. Computer Architecture**

20 lectures and 5 tutorials

Aims

To provide an introduction to computer processor and memory architectures, and to the design of personal computer systems.

Objectives***Understanding***

Computer number representations. Design and operation of a simple processor. Building blocks of a computer system.

Knowledge

Computer representations of integer and real numbers. Architecture of a simple digital computer. Computer system components.

Skills

Manipulation of binary representations of integer and real numbers. Design of simple ALUs. Programming a simple digital computer in machine language. Specifying computer configurations.

Syllabus

Representation of integers in a computer, two's-complement arithmetic. Representation of real numbers, range and precision. Architecture and operation of a simple digital computer: the Arithmetic and Logic Unit, the Control and Execution Unit, registers, busses, memory, input/output, machine codes and instruction cycles. Memory technologies: dynamic and static read/write memory; programmable, erasable and electrically alterable read only memory; memory caching, memory decoding. Mass storage technologies: magnetic, optical and magneto/optical disks and tapes.

2. Laboratory

3 sessions of three hours each

Aims

To provide practical experience of basic microprocessor architecture using simulations of digital systems from a parallel adder/subtractor to a simple digital computer.

Objectives*Understanding*

Operation of 8 bit ALU and busses. Addressing modes. The operation of small assembly language programs.

Knowledge

Representation of positive and negative integers in a computer. Sequence of instruction cycles. Development of the Von Neumann architecture.

Skills

Ability to manipulate binary numbers; to write simple machine code programs.

Syllabus

An Arithmetic & Logic unit, number systems, flags; a simplified processor with an Accumulator and data memory; processor instruction cycles and timing diagrams; a simple Von Neumann digital computer; a machine code program to operate a stepping motor.

Recommended books

Authors	Title, edition	Publisher	Year	ISBN	Cost	Code
Gibson J.R.	Electronic Logic Circuits, 3 rd ed.	Arnold	1996	0-340-54377-9	£18	B

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

Study times

Type	Details
Lectures and tutorials	25 hours
Laboratories and Lab. Report	10 hours
Tutorial Sheets	20 hours
Review and consolidation of course material	30 hours
Final revision and examination	15 hours

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

Components of assessment

%	Type	Details
100	Degree Examination	90 minute paper; all questions compulsory.

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