

## Course Aims

This course aims to:

- provide you with a general understanding of how a computer works,
- explain the structure and functions of an operating system,
- explain the need for concurrency control and how to implement it,
- illustrate key operating system aspects by concrete example, and
- prepare you for future courses. . .

## Course Objectives

At the end of the course you should be able to:

- describe the fetch-execute cycle of a computer,
- understand the different types of information which may be stored within a computer memory,
- compare and contrast CPU scheduling algorithms,
- explain the following: process, address space, kernel and user thread,
- distinguish paged and segmented virtual memory,
- outline how files are managed,
- explain with examples why concurrency control is needed,
- understand how concurrency control can be implemented,
- discuss the relative merits of Unix and NT. . .

## Course Outline

- **Part I: Computer Organisation**
  - Computer Foundations
  - Operation of a Simple Computer.
  - Input/Output.
- **Part II: Operating System Functions**
  - Introduction to Operating Systems.
  - Processes & Scheduling.
  - Memory Management.
  - Filing Systems.
- **Part III: Concurrency Control**
  - Mutual exclusion and condition synchronisation.
  - Multi-threading: user and kernel threads.
  - Implementation and use of semaphores.
  - Inter-process Communication (IPC).
- **Part IV: Case Studies**
  - Unix and Windows NT.

## Recommended Reading

- books for your Computer Design course, e.g. Hennessy J & Patterson D (2002). Computer Architecture: a quantitative approach. Morgan Kaufmann (ED3), also 1996 ED2  
Patterson D & Hennessy J (1998). Computer Organization & Design. Morgan Kaufmann (ED2).
- Jean Bacon and Tim Harris (2003) Operating Systems, Concurrent and distributed software design. Addison Wesley. Instructor's Guide available - see teaching course material. Based on and overlaps with Jean Bacon Concurrent Systems ED2 (library copies available).
- Silberschatz A, (Peterson J), Galvin P, (Gagne G.) Operating Systems Concepts (recent editions, 5th, 6th, 7th as available) Addison Wesley 1998, 2001, 2005.
- OS books contain case studies on UNIX and NT. There are specialist books on both - not required reading.