

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 hardware/architecture courses, e.g. Patterson D and Hennessy J
Computer Organization & Design (2nd Ed)
Morgan Kaufmann 1998.
- Jean Bacon and Tim Harris
Operating Systems, Concurrent and distributed software design.
Addison Wesley 2003
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 as available)
Addison Wesley 1998, 2001.
- OS books contain case studies on UNIX and NT.
There are specialist books on both
- not required reading.