



# unit guide

Introduction to Operating Systems

CCA-1-IOS

Faculty of Business,  
Computing and Information  
Management

2006/2007

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## 1.0 UNIT DETAILS

<b>Unit Title:</b>	Introduction to Operating Systems
<b>Unit Level:</b>	1
<b>Unit Reference Number:</b>	CCA-1-IOS
<b>Credit Value:</b>	15 CAT
<b>Student Study Hours:</b>	150
<b>Contact Hours:</b>	60
<b>Private Study Hours:</b>	90
<b>Pre-requisite Learning (If applicable):</b>	None
<b>Co-requisite Units (If applicable):</b>	None
<b>Course(s):</b>	HNC/D CS
<b>Year and Semester</b>	2,1
<b>Unit Coordinator:</b>	Dr Dave Protheroe
<b>UC Contact Details (Tel, Email, Room)</b>	7512, prothed@lsbu.ac.uk, N112
<b>Teaching Team &amp; Contact Details:</b>	
<b>Subject Area:</b>	SDNC
<b>Summary of Assessment Method:</b>	Coursework

## 2.0 SHORT DESCRIPTION

The unit introduces the basic design issues of operating systems and explains how the basic components of computer system (hardware components and operating system components) interact with each other and with the user. Its aim is to enable the student to understand and use different types of operating systems and to be able to use the literature and handbooks describing advanced operating systems functions. It also describes the fundamental concepts of concurrency and interprocess communication.

## 3.0 AIMS OF THE UNIT

This unit aims to provide the student with an understanding of principles of operating systems, including concurrency.

## 4.0 LEARNING OUTCOMES

On completion of the unit the student should:

- ◆ Understand the organization and design issues involved in the creation of an operating system.
- ◆ Be familiar with concepts such as processes, multitasking, drivers, file management, etc.
- ◆ Have an understanding of synchronization principles including critical sections, semaphores, monitors, mailboxes, deadlock, etc.
- ◆ Understand the basic operation and design issues of a networked or distributed operating system.

## 5.0 INTRODUCTION TO STUDYING THE UNIT

### 5.1 OVERVIEW OF THE MAIN CONTENT

The unit will cover the following topics:

- Evolution of current OS
- OS organisation, processes, files and other resources
- Process management
- Scheduling
- Memory management
- Virtual memory
- Device management
- Input and output
- File management
- Synchronization and Deadlock
- Distributed computing

### 5.2 OVERVIEW OF TYPES OF CLASSES

Time spent each week/ in total: 2 hours in lectures, 2 tutorials; and 6 hours in private study.

Organization of weekly time slots: The 2 hours of lectures and 2 tutorials will take the form of formal lectures followed by tutorial laboratory sessions.

## 6.0 THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Weekly teaching programme (indicative) :

<b>Week</b>	<b>Lecture</b>	<b>Assessment</b>
1	Overview of computer systems and operating systems. The functions and different types of operating systems. The main components that form an operating system. User interface.	

2	Processors and processes. Process states. Multithreading. Representing processes, tasks and threads. Symmetric multiprocessing.	
3	Process manager. Process creation and termination. Thread state, context switching and termination.	
4	Memory management. Virtual memory, base and length registers. Segmentation and paging.	
5	Input/output processing. I/O subsystem. Synchronous and asynchronous I/O.	Test 1, weeks 1-4
6	Input/output processing. Interface with hardware, Device drivers.	
7	File management. Filesystem functions, implementation. Permissions	Assignment hand-out
8	Security. Threats and countermeasures.	
9	Concurrency. Mutual exclusion: software and hardware. Implementation of semaphores, message passing, monitors.	Test 2, weeks 5-8
10	Concurrency. Deadlock and starvation. Deadlock prevention, avoidance and detection.	
11	Distributed systems. Naming. Sockets. Remote procedure call. Shared memory and file systems.	
12	Distributed Coordination. Mutual exclusion. Concurrency control. Deadlock handling.	
13	Review. Future directions.	Test 3, weeks 9-12 Assignment hand-in

## 7.0 ASSESMENT OF THE UNIT

Assessment consists of three in-class tests held during the tutorial sessions and a coursework assignment.

Each test lasts 60 minutes and carries 20% towards the overall mark for this unit. The coursework assignment carries 40% towards the overall mark for this unit.

Logbooks containing **hand-written notes only** may be used during the in-class tests. No printed or copied material may be used.

## 8.0 LEARNING RESOURCES

### CORE MATERIALS

The topics in this unit are covered by the large majority of OS text books and you will find that almost any such book published in the past 10-15 years will be useful.

Although the basic concepts remain unchanged, newer books will use current systems (Linux, Windows 2003) as case studies.

Silberschatz, A., Galvin, P., Gagne, G.  
Operating Systems Concepts, Windows XP Update Edition, Sixth Edition. John Willey & Sons, Inc., 2003

Tanenbaum, A. S. Modern Operating Systems.  
Prentice Hall, 2001.

Stallings, W. Operating Systems: Internals and design principles.  
Pearson – Prentice Hall. 2005.

H.M. Deitel, P.J. Deitel, D.R. Choffnes  
Operating Systems.  
Prentice Hall, 2004,

Gary Nutt, Operating Systems. A Modern Perspective.  
Addison-Wesley, 2002.

## OPTIONAL MATERIALS

Irv Englander. The Architecture of Computer Hardware and Systems Software. An Information Technology Approach. John Willey & Sons, Inc., 2000,

Mike Joy, Stephen Jarvis and Michael Luck. Introducing UNIX and Linux. Palgrave Macmillan, 2002.

Paul K. Andersen. Just Enough UNIX. (4th Ed.), McGraw-Hill, 2003

Sumitabha Das. Your UNIX: The Ultimate Guide. McGraw-Hill, 2001

M. Ben-Ari. Principles of Concurrent and Distributed Programming.  
Prentice Hall, 1990

## UNIT WEB SITE

[www.scism.lsbu.ac.uk/~protheroe/ios](http://www.scism.lsbu.ac.uk/~protheroe/ios)