

Module: Operating Systems 251

Module name:	Operating Systems 251
Code:	OPS251
NQF level:	6
Type:	Core – Diploma in Information Technology (all stream)
Contact Time:	30 hours
Structured Time	6 hours
Self-directed time	34 hours
Notional hours:	70 hours
Credits:	7
Prerequisites:	COA151

Purpose

The course introduces fundamental operating system topics and includes both computer system and operating system structures. Students will learn how processes, threads, concurrent programming, interrupt handling, CPU scheduling and process synchronization, and I/O system memory management affect the system structure. Additionally, students will learn how virtual memory, deadlocks, file system, and command interpreters relate to client/server systems

Outcomes

Upon successful completion this module, the student will be able to:

- Demonstrate a detailed understanding of the main areas of the functions of contemporary operating systems including key terms, concepts and facts and current trends in operating systems.
- Select and apply common algorithms used for scheduling of tasks in operating systems.
- Evaluate performance of modern operating systems, and the relative merits and suitability of each for complex user applications against given criteria.
- Identify and analyse various approaches to problems related to process management and synchronization as well as to apply learned methods to solve basic problems.
- Evaluate different sources of information on policies for scheduling, deadlocks, memory management, and synchronization.

Assessment

- Continuous evaluation of theoretical work through two written assignments, one formative test, and a summative test.
- Continuous evaluation through tracking of progress, offering support, guidance and provision of constant stream of opportunities to prove mastery of subject material and pursuing more challenging work as they master the basics.
- Final assessment through a written examination.

Teaching and Learning

Learning materials

Prescribed Book

- Operating Systems Concepts IT without frontiers (2014).

Additional Material

- 📖 Silberschatz, A., Galvin, P.B., Gagne, G., (2005). *Operating System Concepts*, WILEY

Learning activities

Learning will be facilitated by the lecturer with student centred activities that involve problem based learning where students are presented with challenges that replicate the situation in the real world environment. This will be achieved through a combination between presentation of theoretical concepts, guided exercises, group work and discussions together with two mandatory assignments to be completed during the module.

Notional learning hours

Activity	Units	Contact Time	Structured Time	Self-Directed Time
Lecture		27.0		13.0
Formative feedback		3.0		
Project				
Assignment	2			6.0
Test	2		4.0	8.0
Exam	1		2.0	7.0
		30.0	6.0	34.0

Syllabus

- Functions of the Operating System.
 - Process Management
 - Storage Management
 - Protection and Security
 - Distributed Systems, Special-Purpose Systems
 - Mechanisms to support client-server models, hand-held devices
 - Operating-System Services.
 - User Operating-System Interface
- System Calls
 - Types of System Calls
 - System Programs
 - Virtual Machines
- Process Concept
 - States and state diagrams
 - Structures (ready list, process control blocks, and so forth)
 - Process Scheduling

- Dispatching and context switching
 - Inter-process communication
- Overview of threading
 - Multithreading Models
 - Thread Libraries
 - Threading Issues
- CPU Scheduling: Basic Concepts
 - Scheduling Criteria
 - Scheduling Algorithms
 - Multiple-Processor Scheduling
 - Thread Scheduling
 - Pre-emptive and non-pre-emptive scheduling
- Deadlock Characterization
 - Methods for Handling Deadlocks
 - Recovery from Deadlock
 - Deadlock Avoidance
- Memory Management
 - Review of physical memory and memory management hardware
 - Overlays, swapping, and partitions
 - Paging and segmentation
 - Thrashing