# MODULE SPECIFICATION

**Code: UFEEHJ-30-2**  **Title: Operating Systems and Systems Administration**  **Version: 2008**

**Level: 2**  **UWE credit rating: 30**  **ECTS credit rating: 15**

**Module Type: Standard**

**Owning Faculty: Bristol Institute of Technology**  **Field: Computer Science**

**Valid from: 1st September 2008**  **Discontinued From: 31st August 2009**

**Pre-requisites:**
UFEEHE-30-1 Programming in C
 OR UFEEHF-30-1 Computer Systems Architecture
 OR UFEETS-20-1 Programming in C
 OR UFEEHV-20-1 Computer Systems

**Co-requisites:** None
**Excluded combinations:** None

## Learning Outcomes

On completion of this module a student will typically be able to:-  *Assessed in component(s):*

A. Show a detailed knowledge and understanding of

i)  the design, structure and implementation of modern networked operating systems (NOS)  A, B

ii)  the data structures and interfaces of a NOS  A, B

B. Demonstrate subject specific skills with respect to

i)  write small utility programs, in both script and compiler level languages, that interface to the system primitives  B

ii)  to be able to administer user accounts and manage users on a NOS  B

iii)  to be able to build, install and boot a networked machine  B

iv)  to be able to install and upgrade software on a NOS  B

C. Show cognitive skills with respect to

i)  understand the networking protocols that underpin the operation of a NOS  A, B

ii)  to understand the security problems and solutions on a network  A, B

D. Demonstrate key transferable skills in

i)  communication skills  A, B

| | |
|---|---|
| ii) self-management skills | A, B |
| iii) IT skills in context | A, B |
| iv) problem formulation and decision making | A, B |

**Syllabus Outline**

Operating Systems

Operating System Organisation models and structures

Process & Object Management kernel services, interrupt handlers, scheduling.

Interprocess Communication event handling, message passing, synchronous-asynchronous, shared memory

Concurrency and Synchronisation semaphores, critical regions, monitors, message passing, multi-threaded processes

Memory Management Organisation algorithms and policies, Virtual Memory Management

I/O Management Device driver design, Buffering and interrupt handling.

File & Persistent Object Management File organisation, directories and naming, index nodes, disk block management. Network & distributed file systems Protection and Security Models for secure computing, access control, capability based systems, access control lists

Networked Systems

Computer network architecture\'s and models Layered models, peer protocols, the ISO OSI model

Protocol Specification and Design Specfication techniques -FSM, layered protocols, error correction Connection vs connectionless protocols

Medium Access Control Protocols MAC techniques

Subnetworks and Internetworks network layer design, routing and switching, addressing and naming network topology

Transport Services TLIs

Network & Distributed Systems Management Security issues, fault, monitoring and accounting issues.

TCP/IP protocols IP layer, ICMP, ARP TCP socket programming Applications IPV4 and IPng Administering a TCP IP network

System Administration Specifying and installing an OS and network Initialise the system for user and applications Install devices, software packages and communication links Making the system secure, investigation of security strategies Instigation of system maintenance - backup, user control Document system and system modifications

## Teaching and Learning Methods

For the most part the course will be delivered through practicals and lectures. The theoretical content will be covered in lectures. In the practical sessions students will gain understanding through designing and implementing system software components. For the systems administration part of the course the students will be divided into groups and be required to configure and manage a computer system and offer this computing service to the rest of the cohort.

An extended case-study, supported by focussed tutorials and practicals, will allow the students to follow through an example application from design to implementation, and appreciate the relevance of all the component parts of the module syllabus. Examples of case studies could be: creating a VPN (virtual private network) within the existing network, implementing a firewall/bastion host/proxy security strategy within the network, full automate the user account administration of the system.

## Reading Strategy

There will be a set text or texts which students are expected to buy. Other essential reading will be provided electronically.

Further reading is advisable for this module. Students will be encouraged to explore at least one of the titles held in the library on this topic. A current list of such titles will be given on the module webpage and revised annually. In addition, links to appropriate additional reading in electronic form will be placed on the module webpage.

## Indicative Reading List

*The following list is offered to provide validation panels/accrediting bodies with an indication of the type and level of information students may be expected to consult. As such, its currency may wane during the life span of the module specification. However, CURRENT advice on readings will be available via other more frequently updated mechanisms.*

Selected Papers from:- ACM SIGOPS Operating Systems Review Proceedings of the Symposia on Operating System Principles Computing Surveys Communications of the ACM

Burgess, M (2000). *Principles of Network and Systems Administration,*, Wiley

Tanenbaum, A (2000). *Computer Networks (3rd ed),*, Prentice-Hall

Tanenbaum, A (2001). *Modern Operating Systems (2nd ed),*, Prentice-Hall

Tanenbaum, A (1995). *Distributed Operating Systems,*, Prentice-Hall

Halsall, F (1995). *Data Communications, Computer Networks & Open Systems, A*, Addison-Wesley

Bacon, J (1993). *Concurrent Systems,*, Addison-Wesley

Andrews, G (1991). *Concurrent Programming*, Benjamin/Cummings

**Assessment**

**Weighting between components A and B**   A: 50% B: 50%

**ATTEMPT 1**
**First Assessment Opportunity**

| Element Description | % of Component | % of Assessment |
| --- | --- | --- |
| **Component A (Controlled Conditions)** | | |
| Test - 1 | 50% | 25% |
| Test - 2 | 50% | 25% |
| **Component B** | | |
| Coursework - 1 | 50% | 25% |
| Coursework - 2 | 50% | 25% |