THE INTERNATIONAL QUALIFICATIONS AND ASSESSMENT CENTRE (IQAC)

«Approved»

2025 y. «____» _____

Programme	**Level 3 International Foundation Year Diploma in Information Technology**		
Unit Number/ Unit Title	**Unit 2 Operating System**		
Cohort Code:	L03OPS-U2		
Unit Level	Level 3		
Total Credits/Hours	Total qualification time 200/ Total Guided learning hours 90/ Self-guided learning hours 110		
Credits	20 CATS/ 10 ECTS		
Lecturer			
Start Date		**End Date**	

Unit Aims	This unit aims to provide students with a comprehensive understanding of operating systems (OS) and their role in computing environments. Students will explore the fundamental concepts, components, and functionalities of operating systems, including process management, memory management, file systems, and security. The unit aims to equip students with the knowledge and skills to effectively utilize and manage operating systems, addressing practical aspects such as installation, configuration, troubleshooting, and optimization.
Differentiation Strategies *(e.g. planned activities or support for individual learners according to their needs)*	The total number of students to be in the lesson is approximately 20. This is a multicultural group of students predominantly between the ages of 24 – 45, with numerous ethnic, gender, and creed background. These are UK academic level 5 students; hence it is assumed that they have practical, theoretical, or technological knowledge and understanding of a subject or field of work to find ways forward in broadly defined, complex contexts. These students must be able to generate information, evaluate, synthesise the use information from a variety of sources. Various approaches to addressing the various identified students needs will be adopted throughout the lesson. Such will include:- 1. Progressive tasks

	2. Digital resources 3. Verbal support 4. Variable outcomes 5. Collaborative learning 6. Ongoing assessment 7. Flexible-pace learning
Equality & Diversity	Variety of teaching techniques will be employed to ensure that the needs of each individual learner are met.
Safeguarding & Prevent	Safeguarding policies and the Prevent duty are strictly observed to ensure the safety, well-being, and inclusivity of all students and staff.
Health & Safety	SIRM H&S policies will be maintained.
Learning Resources	**Teaching and Learning Materials** • "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne • "Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos

Learning Outcome	Assessment Criteria
LO1: Understand the basic principles and components of operating systems.	1.1 Define what an operating system is and its functions. 1.2 Explain process management in an operating system. 1.3 Describe memory management techniques used by operating systems.
LO2: Demonstrate practical skills in operating system installation and configuration.	2.1 Install and configure an operating system on different hardware platforms 2.2 Manage users, permissions, and security settings within an operating system. 2.3 Troubleshoot common issues related to operating system installation and configuration.
LO3: Evaluate advanced concepts and technologies in operating systems.	3.1 Analyze different types of file systems and their features. 3.2 Discuss virtualization and its role in modern computing environments. 3.3 Evaluate the impact of operating system design choices on system performance and reliability.

No	Learning Outcome / Topic	Learning and Teaching Activities	Which assessment criteria does the session relate to?	Day/month/ year/ signature
1.	Introduction to operating systems. The concept of operating system. Classification of computer systems	**Introduction to the unit and assignments** - What is an Operating System? - Historical development and types of operating systems - OS functions and components	1.1 Define what an operating system is and its functions	
2.	Components of computing systems. Operating system as an advanced machine and resource manager.	**Content:** Define components of computing systems (hardware, software, data).	1.2 Explain process management in an operating system	

		Activity: Use diagrams to illustrate the architecture of computing systems. **Objective:** Provide a foundational understanding of how different components interact.		
3.	Principles of operating system construction Basic principles of operating system construction.	Define the role of an operating system in managing hardware and software resources in computing systems. Explain the basic principles guiding the construction of operating systems, including separation of mechanism and policy, abstraction, modularity, and concurrency. Analyze and compare different operating systems based on the principles discussed. Articulate the importance of modular design and abstraction in enhancing OS functionality and maintainability. Demonstrate an understanding of concurrency issues and solutions in operating systems.	1.3 Describe memory management techniques used by OS	
4.	Practice	Making flashcard ISO Working with Rufus Downloading different types OS (example Chrome OS and Windows 10)	LO1	
5.	Practice	Installing Chrome OS with formatting D	LO1	

		disk Installing Windows 10 with save way without formatting disk		
6.	Operating system. frequency, modularity, mobility, security principles, etc.	**Frequency** • Explanation of frequency in the context of operating systems • Importance of response time and throughput in system performance **Modularity** • Definition and significance of modular design in OS construction • Advantages of modularity: maintainability, scalability, and reusability • Examples of modular operating systems **Mobility** • Overview of mobility principles in operating systems • Discussion of mobile operating systems and their unique challenges • Impact of cloud computing and virtualization on mobility **Security Principles** • Importance of security in operating systems	2.1 Install and configure an OS on different hardware platforms	

		• Key security principles: confidentiality, integrity, and availability • Techniques for implementing security: access control, encryption, and auditing Discussion of common security threats and vulnerabilities		
7.	Practice	**Working with PowerShell** **Cmd command** Troubleshooting installation errors Common configuration issues and solutions	LO2	
8.	Architecture of operating systems. Operating system architecture (kernel, command processor, I/O system, file system)	I. Introduction to Operating System Architecture Definition and importance of operating system architecture Overview of the components and their roles within the OS II. Kernel Definition and purpose of the kernel Types of kernels: monolithic, microkernel, and hybrid III. Command Processor	LO2	
9.	Practice	Android and iOS	LO2	
10.	Half-Term Exam	- Review of LO1 topics: OS components, process, and memory		

		management - Practice questions and mock assessment - **Half-term assessment** based on LO1 (theory)		
11.	Multiprocessing of operating system, batch processing, real-time systems, time-sharing, distributed systems, object-oriented approach, client-server models, etc.	Multiprocessing of operating system, batch processing, real-time systems, time-sharing, distributed systems, object-oriented approach, client-server models, etc.	LO2	
12.	The concept of process. The state of processes. Process scheduling algorithms and parameters. Semaphores. Multithreading of programs.	The state of processes. Process scheduling algorithms and parameters. Semaphores. Multithreading of programs.	LO2	
13.	Process management in operating systems. Process management, scheduling, dispatching and synchronization in operating system.	Process management in operating systems. Process management, scheduling, dispatching and synchronization in operating system.	LO2	
14.	Final Exam Preparation & Review	- Comprehensive review of all learning outcomes - Practice questions and revision of key topics	LO2	
15.	Final Exam	- **Final-term assessment** covering all learning outcomes (theory and practical elements)	LO2	

16.	Process management, scheduling, dispatching and synchronization in an operating system.	- Introduction to virtualization: Types of virtualization (e.g., hardware, software) - Role of virtualization in cloud computing	LO2	
17.	Feedback & Reflection	- Review of final exam - Individual feedback on performance - Reflective discussion on key learning points	LO1, LO2	
18.	Threads in operating systems The concept of threads in an operating system.	**Thread Lifecycle** • Thread creation and termination • Thread states (running, ready, blocked) • Thread scheduling algorithms **Thread Synchronization** • Need for synchronization in multi-threaded systems • Synchronization primitives (locks, semaphores, monitors) • Race conditions and deadlocks **Benefits and Challenges of Threads** • Improved responsiveness and resource utilization Increased complexity in program design and debugging	LO3	
19.	Introduction to operating systems. The concept of operating system. Classification of computer systems	**Functions of an Operating System** • Key functions: process management, memory management, file system management, and device management. **Classification of Operating Systems**	LO3	

		• Overview of different types: batch, time-sharing, real-time, distributed, and embedded systems. **Operating System Architecture** • Basic architecture: kernel, user space, and system calls. Differences between monolithic and microkernel architectures.		
20.	The concept of interlocking in an operating system. Deadlock problems. Resource allocation schedule.	Deadlock handling techniques. Deadlock prevention. Barker's algorithm.	LO3	
21.	Memory management in an operating system. Memory and its mapping, virtual address space, general principles of memory management.	Memory management in an operating system. Memory and its mapping, virtual address space, general principles of memory management.	LO3	
22.	Practice	VirtualBox	LO3	
23.	Memory allocation to static and dynamic partitions, segmented, page and segment-page organization.	Memory allocation to static and dynamic partitions, segmented, page and segment-page organization.	LO3	
24.	Half-Term Exam			
25.	Virtual memory. The concept of virtual memory.	VirtualBox	LO3	
26.	Paged organization of virtual memory. FIFO, LRU and "second chance" algorithms File systems in operating systems. File system	- Overview of file systems (FAT32, NTFS, ext4, etc.) - File management and access control	LO3	

	functions and data hierarchy, file location table.			
27.	Practice	- Overview of file systems (FAT32, NTFS, ext4, etc.) - File management and access control	LO3	
28.	File system capabilities and reliability. FAT, NTFS, HPFS, ext2, ext3, ext4 and other file systems.	Virtual file systems (VFS) and network file systems (NFS). External memory management, caching, transactional file systems. Network file system (NTF).	LO3	
29.	Final Exam Preparation & Review		LO1 LO2 LO3	
30.	Final Exam			