

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Fundamentals of Operating Systems		Module Delivery	
Module Type	Support		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	FUOS214			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	2	Semester of Delivery		1
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Maisa'a Abid Ali Khodher, Israa Ali		e-mail	110044@uotechnology.edu.iq
Module Leader's Acad. Title	Professor, Asst.Lec.		Module Leader's Qualification	Ph.D.
Module Tutor	Maisa'a Abid Ali Khodher, Israa Ali		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	1/4/2026		Version Number	1.0

Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None		Semester	
Co-requisites module	None		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The operating system acts as a bridge between the user of a computer system and the computer hardware. All of the applications required for your programs to utilize the computer hardware are located on top of the operating system. 1. The operating system increases the production efficiency. 2. The operating system performs a good job of concealing the computer's intricate details. 3. In the absence of an operating system, users would have to deal with the hardware directly without access to the pre-configured utility packages that come with an operating system. 4. The operating system serves as a neutral arbitrator. It serves a management role in the computer system by ensuring equitable resource distribution among various operations and consumers. 5. It is the process of determining which processes should be executed at which given time. 6. It is the process of protecting the computer system from unauthorized access and malicious attacks. 7. You can effectively study modern information technology only with the use of open-source software such as Linux. 8. Access to the source code has a positive effect on the learning process, as it allows you to understand how the system works from the inside. The future specialist must have a deep knowledge of the software and hardware of computers. To do this, students should use an operating system that provides such capabilities. One example of such a system is Linux, which is a free and open-source software. 9. The Linux operating system is an effective tool used in various areas of information technology: computer networks and services, server platforms, cybersecurity, embedded devices, the Internet of Things
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. It contains a theory component about the concepts and principles that underlie modern operating systems. 2. a practice component to relate theoretical principles with operating system implementation. 3. Discuss concurrency (processes concept, Multithreads, scheduling CPU, and deadlocks). 4. Discusses memory management (memory management strategies memory management such as contiguous memory allocation, paging, and segmentation). 5. Discuss file systems, allocation memory, and free-space management, including topics such as secondary storage systems, such as disk scheduling. 6. Illustrate the above concepts such as LINUX network operating system as a case study. 7. To introduce the student to Linux most popular command line shell, the BASH. This course will cover basic commands used in Linux.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – introduction of OS Components of the operating system, what operating system do? Computer system organization, computer system structure, process management, memory management, storage management, distributed system, special-purpose systems, computing environments. [SSWL=20 hrs] Process concept, process scheduling, operations on process, Multithreading models, scheduling algorithms of CPU (FCFS, SJF, Priority, Round Robin), Deadlocks, resource graph, characterization, handling, prevent, a voidance, detection, and recovery, Banker's algorithm. [SSWL= 20 hrs] Memory management swapping, paging, segmentation, file system, allocation method, and free-space management, Memory management swapping, paging, segmentation, file system, allocation method, and free-space management. [SSWL=13 hrs] <u>Part B -Linux operating system</u> Linux server Ubuntu network operating system. <u>Set up a folder/file/document that everyone on your network can access. This is helpful if you want to contribute to a common folder from different devices.</u> Installation and configuration, Linux Basic Installation, Linux shell, and Basic shell commands, Command Line File Manipulation, Command Line File processing <u>Basic Bash Scripting, writing and executing bash scripts. To introduce the student to Linux's most popular command line shell, the BASH. This course will cover basic commands used in Unix/Linux.</u> <u>Command Line File Manipulation and Processing,</u> Understand file types used in the LINUX system, Create, View, and modify file access permission, Change the ownership of files and directories, and Create backup for critical files using archives. Advanced bash scripts: For-loop, Do-While iteration statements, conditional statements: If-statement, Case statement bash scripts.

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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Operating systems are the core software that manages the resources and activities of a computer. They are essential for any programmer, developer, or IT professional to understand and use effectively. However, teaching operating system concepts and skills can be challenging, as they involve complex and abstract topics, such as processes, memory, file systems, concurrency, and networking. And by considering types of simple experiments involving some sampling activities that are interesting to the students. Furthermore, this course encourages students to work with the main commands of the Linux operating system; - construction of chains of commands; file/directory operation commands; and writing scripts in the built-in shell programming language. The purpose of this part of the course is to train specialists who know the architecture and principles of building the Linux operating system, as well as practical skills in using this system as a tool for solving various tasks.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10

Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - computer system organization, architecture, and structure.
Week 2	Operating system operations, process, memory, and storage management.
Week 3	Distributed system, special-purpose system, and computing environments
Week 4	Process concept, process scheduling, operations on process.
Week 5	Multithreading models, scheduling algorithms of CPU.
Week 6	Deadlocks, resource graph, characterization, handling, prevent, a voidance, detection, and recovery, Banker's algorithm.
Week 7	Memory management swapping, paging, segmentation, file system, allocation method, and free-space management.
Week 8	Secondary storage, disk scheduling, FCFS, SJF, Priority, Round Robin algorithms.
Week 9	Network Operating System (NOS): Overview and fundamentals
Week 10	Basic NOS architectures: • Peer to Peer network architecture • Client-Server architecture
Week 11	• Active Directory (AD) • Domain Controller (DC)
Week 12	Case Study: LINUX network operating system: • Overview and its features • Basic architecture • Kernal and shell features.
Week 13	Linux command line tools File/directory management using bash commands. (create, open, edit,...)
Week 14	bash scripts written by shell programming language. • For loop iteration operation.

	Do-While statement
Week 15	Conditional statements - If-statement scripts. - Case-statement scripts.
Week 16	Preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Basic File Operations
Week 2	Lab 2: Process Management
Week 3	Lab 3: Threads and Multithreading: Part1
Week 4	Lab 4: Threads and Multithreading: Part2
Week 5	Lab 5: CPU Scheduling Algorithms: FCFS, SJF, Priority
Week 6	Lab 6: CPU Scheduling Algorithms: Priority
Week 7	Lab 7: CPU Scheduling Algorithms: Round Robin
Week 8	Lab 8: Deadlock
Week 9	Lab 9: Memory Management: Fixed Partitioning
Week 10	Lab 10: Memory Management: Dynamic Partitioning
Week 11	Lab 11: Memory Management: Paging
Week 12	Lab 12: Bash Commands
Week 13	Lab 13: Linux File Operation
Week 14	Lab 14: Linux Bash Script (for loop, do-while)
Week 15	Lab 15: Linux Bash Script (if statement, case)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	Avi Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts" 8 th Edition	No
Recommended Texts	Andrew S. Tanenbaum, "Operating System Design and Implementation", Third Edition.	No
Websites	1- https://www.mbit.edu.in/wp-content/uploads/2020/05/Operating_System_Concepts_8th_EditionA4.pdf 2- https://csc-knu.github.io/sys-prog/books/Andrew%20S.%20Tanenbaum%20-%20Operating%20Systems.%20Design%20and%20Implementation.pdf	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				