هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Operating Systems
Course Code:	CS311
Program:	Computer Science
Department:	Computer Science
College:	College of Computer and Information Sciences
Institution:	Majmaah University
Version:	1
Last Revision Date:	September 12th, 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3(3,0,1)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐ Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 6/Year 3)					
4. Course general Description:					
This Course is designed to develop knowledge and understanding of the Computer Operating System and considered an introduction to the theory and practice behind modern computer operating systems.					
5. Pre-requirements for this course (if any)**:**					
CS210- Data Structures					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
Understand general structure of an operating system and its functions, key concepts such as multiprogramming, understand the role of operating systems in management of computer resources such as processes, memory, CPU, files, disks, input output subsystems and apply important methods and algorithms for scheduling the different activities during the operation of a computer.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**60**	**100%**
2	**E-learning**		
3	**Hybrid** • **Traditional classroom** • **E-learning**		
4	**Distance learning**		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.2				
...				
2.0	**Skills**			
2.1	CLO1- Understand the issues and problems involved in the design of operating systems.	S1	Classroom Teaching	Quiz, Assignment, Mid Exam, Final Exam
2.2	CLO2- Discuss issues of Process Management including Process Structure, Scheduling, Synchronization and Deadlock.	S2	Classroom Teaching	Quiz, Assignment, Mid Exam, Final Exam
2.3	CLO3- Identify problems in concurrent computing and demonstrate scheduling algorithms, synchronization techniques and Deadlock recovery and avoidance algorithms.	S2	Classroom Teaching	Quiz, Assignment, Mid Exam, Final Exam
2.4	CLO4- Demonstrate memory management issues including advance techniques of paging, segmentation and virtual memory	S1	Classroom Teaching, Classroom demonstration	Quiz, Assignment, Mid Exam, Final Exam, Lab Exercises

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.5	CLO5- Discuss the issues related File System Structure, Mass-Storage Structure, I/O Systems I/O Sub-systems	S1	Classroom Teaching	Quiz, Assignment, Mid Exam, Final Exam
2.6				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction** Different OSs (Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Real-Time, Handheld). Computer-System Structures (I/O, Storage, Storage Hierarchy, Hardware Protection, Network).	4
2.	OS-Structures (Components, Services, System Calls, System structure, Virtual Machines, System Design & Implementation).	4
3.	**PROCESS MANAGEMENT** • Processes • Process Concept • Process Scheduling • Operations on Processes • Cooperating Processes • Inter-process Communication • Communication in Client-Server	6
4.	**Threads** • Threads • Multithreading models • Threading Issues • Pthreads, Solaris 2 threads, Windows 2000 threads, Linux Threads, Java Threads	4
5.	**Scheduling** • CPU Scheduling • Scheduling Criteria • Scheduling Algorithms, • Algorithm Evaluation • Process Scheduling Models	6
6.	**Process Synchronization** • Process Synchronization	6

	• Critical-Section Problem • Synchronization Hardware • Semaphores • Critical Regions • Monitors • Classical Problems	
7.	**Deadlocks** • Deadlocks • Deadlock Characterization • Methods for Handling Deadlocks (Prevention, Avoidance, Detection) • Recovery from Deadlock	6
8.	**MEMORY MANAGEMENT** • Address Binding Concept • Swapping • Contiguous Memory Allocation • Paging • Segmentation • Segmentation with Paging	6
9.	**Virtual Memory** • Demand Paging • Page Replacement • Allocation of frames • Thrashing	4
10.	**STORAGE MANAGEMENT** • Mass-Storage Structure • Disk Structure • Disk Scheduling • Disk Management • Swap-Space Management • **RAID Structure**	6
11.	**File-System** **File-System Interface & Implementation**	4
12.	**I/O Systems** • I/O Hardware • Application I/O Interface • Kernel I/O Subsystem • Transforming I/O to Hardware Operations • Streams • Performance	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Week 4, 10	10%
2.	Assignments	Week 5, 9	20%
3.	Midterm Exam	Week 7	20 %
4.	Exercise	Every Week	10 %
5.	Final Exam	Week 11	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Operating System Concepts, 10th edition International Student Version Silberschatz, Galvin, and Gagne, 8th edition, Wiley, 2018.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	PC with Windows/Linux, LCD Projector, Smart Board
Other equipment (depending on the nature of the specialty)	Internet Connection

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Student Survey
Effectiveness of Students' assessment	Instructor	Peer Review
Quality of learning resources	Instructor	Student Survey
The extent to which CLOs have been achieved	Instructor/Students	Direct/Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CS COUNCIL**
REFERENCE NO.	
DATE	