2023
TP-153

Course Specification
(Bachelor)

Course Title:	Operating Systems
Course Code:	COMP - 333
Program:	Bachelor in Computer Science Bachelor in Information Technology
Department:	Computer Science
College:	College of Engineering & Computer Science
Institution:	Jazan University
Version:	*Course Specification Version Number*
Last Revision Date:	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (03 Hours)					
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 introduces a detailed description about operating system objectives, functions and core concepts. Topics include operating system principles, file management systems, memory management, processes and threads, scheduling algorithms and deadlocks.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					

1. **Discuss the basic concepts underlying under operating systems as well as how a typical operating system works.**
2. **Describe the functions and design of operating systems, processes and threads.**
3. **Present the main concept behind traditional (non-distributed) operating systems.**
4. **Explain the algorithms used in CPU Scheduling and virtual memory management.**
5. Analytically discuss the algorithms used in I/O, file management and deadlocks.

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		

No	Mode of Instruction	Contact Hours	Percentage
	● Other (Self Study)		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	26
2.	**Laboratory/Studio**	26
3.	**Field**	
4.	**Tutorial**	
5.	**Others (Exams and Revision)**	8
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Define** the objective and functions of operating system.	K1	● Lectures/Presentations ● Media Lectures ● Tutorials	● Midterm Exam ● Assignment- 1 ● Final Theory Exam
1.2	**Relate** different computer architectures leading to the development of modern operating systems.	K2	● Lectures/Presentations ● Media Lectures	● Midterm Exam ● Assignment- 1 ● Final Theory Exam
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2.0	**Skills**			
2.1	**Evaluate** different approaches of file organization and **judge**	S2	● Discussions ● Active class participation	● Lab Exam ● Final Theory Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	their respective strengths and weaknesses.		• Lab Demonstration	
2.2	**Compare** the differences between types of kernel, processes and threads.	S1	• Discussions • Active class participation	• Assignment-1 • Midterm Exam • Final Theory Exam
2.3	**Measure** the performance of various scheduling algorithms based on different parameters.	S2	• Simulation • Brain storming • Lab Demonstration	• Lab Exam • Final Theory Exam • Assignment-2 (Group Assignment)
2.4	**Analyze** the potential run-time problems arising from the concurrent operation and their possible solutions.	S1	• Active class participation • Problem solving methods	• Assignment – 2 (Group Assignment) • Final Theory Exam
2.5	**Apply** different memory allocation methods, Paging, Segmentation and Page Replacement Algorithms in memory management schema.	S4	• Simulation • Brain storming • Lab Demonstration	• Assignment – 2 (Group Assignment) • Final Theory Exam • Lab Exam
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate** the ability to work in a team to assess and implement various algorithms of operating system to find out the best possible solutions.	V2	Group Discussion	Assignment-2 (Group Assignment)
3.2	**Recognize** and educate the public about choices concerning the application of computing and how those choices affect society.	V1	Survey / Case Study	Assignment-1 (Survey/Case Study)
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C. Course Content

No	List of Topics	Contact Hours
1.	**Operating System Overview** Introduction, Services provided by OS, Computer System Architecture, Multitasking, Multiprogramming, Dual mode Vs Multimode operations, Virtualization, System Calls, OS Structure, User and OS Interface	4T+4P
2.	**Processes and Threads** Process, PCB, Process States, Context Switch, Operation on Process, Thread Overview, Benefits of Multithreading, Multicore Programming Vs Multithreaded Models, Thread Library and Threading Issues	4T+4P
3.	**CPU Scheduling** Types of Scheduling, FCFS, SJF, Priority, RR	4T+5P
4.	**Deadlocks** Concurrency, System Model, Deadlock Characterization, Deadlock prevention, Deadlock avoidance, Deadlock detection using banker's algorithm, Recovery from deadlock	5T+4P
5.	**Memory Management** Address Binding, Logical Vs Physical Address, Dynamic Loading, Dynamic Linking, Swapping, Fixed and Dynamic partitioning, Paging Segmentation, Demand Paging, Thrashing, Page Replacement Algorithms (FIFO,ORA,LRU)	5T+5P
6.	**File Management** File Concept, File Attributes, File Operations, File Management Systems, File Access Methods, File Directories Structure, VFS, Security and Access Control	4T+4P
Total		**26T + 26P**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignment-1	5th Week	10%
2.	Midterm Exam	7th Week	15%
3.	Assignment – 2 (Group Assignment)	9th Week	15%
4.	Lab Exam	As per schedule	20%
5.	Final Theory Exam	As per schedule	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 2018, by Abraham Silberchatz, Peter B. Galvin, Greg Gagne, ISBN: 9781119320913. • Operating Systems – Internals and Design Principles, 9th Edition 2018, by William Stallings, Prentice Hall, ISBN-13: 978-9352866717.
Supportive References	• Operating Systems – Three Easy Pieces, Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, 2018, (Version 1.00), ISBN-13: 978-1985086593 • Modern Operating Systems, Andrew S. Tanenbaum, 2016, Pearson, 4th Edition, ISBN-10: 9789332575776.
Electronic Materials	• http://williamstallings.com/OperatingSystems/OS8e-Student/ • http://www.cs.man.ac.uk/~rizos/CS2051/
Other Learning Materials	• None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom equipped with projector, whiteboard and sufficient seating arrangements. • Lab with software installed and individual computer terminal for each student.
Technology equipment (projector, smart board, software)	• Smartboards, whiteboards and projectors for classroom and lab • Following software for lab work: ▪ Linux (RedHat)
Other equipment (depending on the nature of the specialty)	• None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	CRC / QAU / HoD	Course reports / result analysis
Effectiveness of Students assessment	Students	Course evaluation survey form
Quality of learning resources	Track leaders / CRC	Review meetings and star rating with suggestions for further modification and improvements
The extent to which CLOs have been achieved	Course Teachers / QAU	CLO assessment template that is further verified at course coordinator and QAU level.
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

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