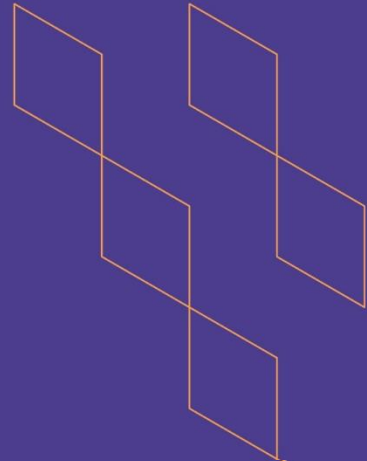




T-104
2022

Course Specification



Course Title: Operating Systems
Course Code: 333 COMP-3
Program: Bachelor in Computer Science Bachelor in Information Technology Bachelor in Computer & Network Engineering
Department: Computer Science
College: College of Computer Science and Information Technology
Institution: Jazan University
Version: V2
Last Revision Date: 12 September 2021



Table of Contents:

Content	Page
A. General Information about the course	3
1. Teaching mode (mark all that apply) 2. Contact Hours (based on the academic semester)	4
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods	4
C. Course Content	5
D. Student Assessment Activities	7
E. Learning Resources and Facilities	7
1. References and Learning Resources	7
2. Required Facilities and Equipment	7
F. Assessment of Course Quality	8
G. Specification Approval Data	8

A. General information about the course:

Course Identification

1. Credit hours: 3

2. Course type

a. University ☐ College ☒ Department ☐ Track ☐ Others ☐

b. Required ☒ Elective ☐

3. Level/year at which this course is offered:

Level 8 / 3rd Year

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. Co- requirements for this course (if any):

None

7. Course Main Objective(s)

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

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	44	80%
2.	E-learning		
	Hybrid		
3.	<ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4.	Distance learning (Self Learning)	11	20%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	8
	Total	52

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	Class lectures and lecture notes	Midterm/ Assignment 1 / Final Exam
1.2	Relate different computer architectures leading to the development of modern operating systems.	K2	Class lectures/ lecture notes/ Case studies	Midterm/ Assignment 1/ Final Exam
2.0	Skills			
2.1	Evaluate different approaches of file organization and judge their respective strengths and weaknesses	S2	Class lectures/ lecture notes/Case studies	Midterm/ Assignment 1/ Lab Exam/ Final Exam
2.2	Compare the differences between types of kernels, processes and threads.	S1	Class lectures/ lecture notes/ Case studies / Brainstorming	Mid term/ Final Exam/ Assignments 1
2.3	Measure the performance of various scheduling algorithms based on different parameters.	S2	Class lectures/ Presentations/ lab demonstrations	Final Exam/ Assignment 2 (Group Assignment) / Final Lab
2.4	Analyze the potential run-time problems arising from the concurrent operation and their possible solutions.	S1	Class lectures/ presentations/ lab demonstrations	Final Exam/ Assignment 2 (Group Assignment)
2.5	Apply different memory allocation methods, Paging, Segmentation and Page Replacement Algorithms in memory management schema.	S4	Simulation/ Brains storming/ Lab demonstration	Assignment-2 (Group Assignment) Final Exam/ Lab Exam



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
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	Small group discussion / Brainstorming/ Class discussion to train students to think independently	Group Assignment-2 (Group Assignment) / Final Exam
3.2	Recognize and educate about choices concerning the application of computing and how those choices affect society.	V1	Group discussion	Assignment-2 (Group Assignment)

C. Course Content

No	List of Topics	Contact Hours
1.	Chapter – 1 OPERATING SYSTEM OVERVIEW a) Introduction, What OS Do?, Computer System Architecture b) Multitasking, Multiprogramming, Dual Mode and Multimode operations c) Virtualization and System Calls, User and OS Interface, Operating System Structure	3T + 3P
2.	Chapter – 2 PROCESSES AND THREADS a) Process, Process states, Process control block b) Process Scheduling, Context Switch, Operations on Processes, Interprocess communication, c) Thread Overview, Benefits of Multithreading, Multithreading Models Self-Study: Thread Library and Threading Issues	3T + 3P
3.	Chapter – 3 CPU SCHEDULING a) CPU Scheduling: Basic Concepts, Scheduling Criteria, b) Scheduling Algorithms (FCFS and SJF) c) Scheduling Algorithms (Priority and RR)	3T + 3P
4.	Chapter – 4 SYNCHRONIZATION AND DEADLOCKS a) Synchronization: Race condition, critical section, Semaphores, Monitors b) Liveness, Deadlock, Resource Allocation Graph c) Deadlock prevention, Deadlock avoidance, Deadlock Detection d) Banker's Algorithm, Recovery from deadlock Self-Study: Mutex locks, Concurrency	4T + 4P



5.	Chapter-5 MEMORY MANAGEMENT a) Basic Hardware, Address Binding, Logical Vs Physical Address space, Dynamic Loading b) Memory Allocation, Fragmentation Paging, c) Page Replacement Algorithms (FIFO, ORA, LRU) and thrashing Self-Study: Dynamic Linking and Shared Libraries, Swapping Demand Paging, Copy-On-Write, Disk Scheduling	3T + 3P
6.	Chapter – 6 FILE MANAGEMENT a) File Concept, Attributes and Operations b) File types, Access methods c) Directory Structure, Types of Access, d) Access control, Allocation methods, Virtual File systems and security. Self-Study: Other Access methods, Indexed Allocation	4T + 4P
7.	Lab Exam + Revision	2T + 2P
Total		22T+22P

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	6th-7th week	15%
2.	Assignment I	3rd week	10%
3.	Assignment 2 (Case Study/ Group assignment)	6th-7th week	15%
4.	Lab Exam + Lab Assignment	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	<ul style="list-style-type: none"> Operating System Concepts, 10th Edition 2018, by Abraham Silberschatz, 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • http://williamstallings.com/OperatingSystems/OS8e-Student/ • http://www.cs.man.ac.uk/~rizos/CS2051/ • http://cs.nyu.edu/courses/fall12/CSCI-GA.2250-001/
Other Learning Materials	Online tutorial

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Whiteboards and projectors for classroom and labs • Linux (RedHat) • An active internet connection.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL
/COMMITTEE

DEPARTMENT COUNCIL





REFERENCE NO.

DATE

15/10/2022

