Course Specification
(Bachelor)

Course Title:	Operating system Architecture
Course Code:	212 CNET-3
Program:	Computer & Network Engineering
Department:	Electrical and Electronics Engineering
College:	College of Engineering & Computer Science
Institution:	Jazan University
Version:	15
Last Revision Date:	22-09-2024

Table of Contents

A. General information about the course:

1. 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 4 / Year 2)					
4. Course General Description:					
This course introduces the fundamentals concepts of operating system, process management and process state phases, file system, threads and their management in the operating systems as well as goals, principles and domain of protection, access matrix and revocation of access rights					
5. Pre-requirements for this course (if any):					
No pre- requirements					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
This course will develop the students' ability to learn: ● Understand the fundamentals of Operating Systems and the main components of an OS & their functions ● Understand the working of an OS as a resource manager, file system manager, ● Process manager, memory manager and I/O manager and methods used to implement the different parts of OS ● Learning mechanisms of OS to handle processes and threads and their communication ● Learning mechanisms involved in memory management in contemporary OS					

- Gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- Know the components and management aspects of concurrency management

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**	26
2.	**Laboratory/Studio**	26
3.	**Field**	--
4.	**Tutorial**	--
5.	**Others (specify)**	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			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.1	**Define** the objective and functions of the operating system.	K1	• Lectures • Classroom discussions • Lab exercises	• Exam 1 • Assignment 1 • Final Exam
1.2	**Relate** different computer architectures leading to the development of modern operating systems.	K2	• Lectures • Classroom discussions • Lab exercises	• Exam 1 • Assignment 1 • Final Exam
2.0	Skills			
2.1	**Evaluate** different approaches of file organization and **judge** their respective strengths and weaknesses.	S1	• Lectures • Classroom discussions • Lab exercises	• Exam 1 • Assignment 1 • Mini Project • Final Exam
2.2	**Compare** the differences between types of kernels, processes and threads	S3	• Lectures • Classroom discussions • Lab exercises	• Exam 1 • Lab Exam • Mini Project • Final Exam
2.3	**Measure** the performance of various scheduling algorithms based on different parameters.	S2	• Lectures • Classroom discussions • Lab exercises	• Exam 1 • Lab Exam • Mini Project • Final Exam
2.4	**Analyze** the potential run-time problems arising from the concurrent operation and their possible solutions.	S4	• Lectures • Classroom discussions Lab exercises	• Exam 1 • Lab Exam • Mini Project Final Exam
2.5	**Apply** different memory allocation methods, Paging, Segmentation and Page Replacement Algorithms in memory management schema.	S4	• Lectures • Classroom discussions Lab exercises	• Exam 1 • Lab Exam • Mini Project Final 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.	V1	• Lectures • Classroom discussions • Lab exercises	• Lab Exam • Mini Project • Assignment

C. Course Content

No	List of Topics	Contact Hours
1.	**Chapter 1: Introduction to operating system** • Operating system definitions • Computer System Structure • Multiprogrammed Systems • Timesharing System • Parallel Systems • Distributed Systems • Real-Time Systems • Hardware Protection • Dual-Mode Operation • I/O/memory/hardware Protection	6T + 6P
2.	**Chapter – 2: Process management** • Process Concept • Process Scheduling • Operations on Processes • Cooperating Processes • Interprocess Communication	5T + 5P
3.	**Chapter - 3: File system** • Implementing local file systems and directory structures • Implementation of remote file systems • block allocation and free-block algorithms and trade-offs	4T + 4P
4.	**Chapter – 4: Threads** • Overview • Multithreading Models • Threading Issues • Threads • -Threads Benefits • Threads separations • Kernel Threads • User-Level Threads • Kernel level threads • Pthreads • Linux Threads	5T + 5P
5.	**Chapter – 5: Protection** • Goals of Protection • Principles of Protection	

	• Domain of Protection • Access Matrix • Implementation of Access Matrix • Access Control • Revocation of Access Rights • Capability-Based Systems • Language-Based Protection	6T + 6P
6.	**Revision all contents**	2T+2P
7	**Final Exam**	2T + 2P
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	4th Week	10%
2.	Midterm Exam	8th Week	20%
3.	Mini Project	12th Week	10%
4.	Lab Exam	13th Week	20%
5.	Final Exam	15th Week	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	Douglas Comer, "Operating System Design", Pearson Publication, 2rd edition, 2015, ISBN-13: 978-1498712439
Supportive References	Silberschatz, A., Galvin, P. B., & Gagne, G. (2018). Operating System Concepts, 10e Abridged Print Companion. John Wiley & Sons.
Electronic Materials	https://www.wiley.com/en-us/Operating+System+Concepts+Essentials%2C+2nd+Edition-p-9781118804926
Other Learning Materials	www.tryhackme.com

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom equipped with projector and whiteboard and sufficient seating arrangements.** **Lab with software installed and individual computer terminal for each student.**
Technology equipment (projector, smart board, software)	**A well dedicated Linux based Lab with the following facilities:** **A Data show and a Smart / White board.** **Linux Server and clients** **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, HOD**	**Indirect, Direct**
Effectiveness of Students assessment	**CT / CC / HoD**	**Direct**
Quality of learning resources	**TL / CRC / PQC**	**Indirect, Direct**
The extent to which CLOs have been achieved	**CT / CC /TL / PQC**	**Indirect, Direct**
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**DEPARTMENT COUNCIL**
REFERENCE NO.	**ENGCSEEE2411**
DATE	**10/10/24**