ISLAMIC UNIVERSITY OF TECHNOLOGY

Department of Computer Science and Engineering (CSE)
Course Outline and Course Plan

Name of the Teacher	**S. M. Sabit Bananee**	**Position**	**Lecturer**
Department	**CSE**	**Program**	**BSc. Eng. SWE**
Course Code	**CSE 4501**	**Course Title**	**Operating Systems**
Academic Year	**2023-24**	**Semester**	**Winter**
Contact Hours	**3.0**	**Credit Hours**	**3.0**
Textbooks and Reference books	**1. Operating System Concepts 10th Edition** **2. Modern Operating Systems 4th Edition** **3. Operating Systems: Principles and Practice 2nd Edition** **4. Operating Systems: Three Easy Pieces 1.00 Edition**	**Authors**	**1. Abraham Silberschatz, Greg Gagne, and Peter B. Galvin** **2. Andrew S. Tanenbaum and Herbert Bos** **3. Thomas Anderson and Mike Dahlin** **4. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau**
Prerequisites (If any)	**1. CSE 4303: Data Structures** **2. CSE 4305: Computer Organization and Architecture**		
Course Homepage	https://classroom.google.com/c/NzEwMTMwMzE0MDUz		
Teaching Methods/ Approaches	☐ **Lecture√** ☐ **Group discussion√** ☐ **Demonstration√** ☐ **Problem-solving√** ☐ **Project** ☐ **Others: Tutorial classes√**		
Teaching aids	**Multi-media√** **OHP** **Board and Marker√** **Others**		

Course Assessment Method								
Attendance (10%)	**Quiz 15% of Total Marks (Best 3 out of 4)**						**Mid Semester (25%)**	**Semester Final (50%)**
	1st Quiz	**2nd Quiz**	**3rd Quiz**	**4th Quiz**	**Others**		**Week/Date**	**Week/Date**
	Week/Date	**Week/Date**	**Week/Date**	**Week/Date**	**Assignment**	**Homework**		
	3rd Week 18 Sep 2024	**6th Week 09 Oct 2024**	**10th Week 04 Dec 2024**	**13th Week 18 Dec 2024**	**2/3 Assignments**	**Will be given time to time**	**As per the schedule of IUT**	**As per the schedule of IUT**

Grading Policy					
Marks out of 100	**Letter Grade**	**Grade Point**	**Marks out of 100**	**Letter Grade**	**Grade Point**
80 - 100	A+	4.00	55 - 59	B-	2.75
75 - 79	A	3.75	50 - 54	C+	2.50
70 - 74	A-	3.50	45 - 49	C	2.25
65 - 69	B+	3.25	40 - 44	D	2.00
60 - 64	B	3.00	00 - 39	F	0.00

Class Schedule	
Monday	09:15 AM – 10:30 AM
Wednesday	11:45 AM – 01:00 PM

Student's consulting hour	**Wednesday 10:30 AM to 11:30 AM** **Thursday 10:30 AM to 11:30 AM**

Course Contents

Operating System Overview, Unix / Windows History, POSIX, GNU / GLP, Homebrew Club, Open-Source OS Linux. Process Description and Control 2 and 5 states process models, Process Control Structures, Modes of Execution, Process Switching Threads User-Level and Kernel-Level Threads, Performance on Multicore, Linux Process and Thread Management Concurrency: Mutual Exclusion and Synchronization Race Condition, Interrupt Disabling, Producer/Consumer Problem, Monitors, Message Passing Concurrency: Deadlock and Starvation Principles of Deadlock, Hold and Wait, Circular wait, Deadlock Detection Algorithm Memory Management Relocation, Protection, Memory Partitioning, Paging, Segmentation Scheduling Types of Processor Scheduling, Scheduling Algorithms, Traditional UNIX Scheduling I/O Management DMA, I/O Buffering, Disk Scheduling, UNIX SVR4 I/O, Linux I/O OS Security & Threats, Threats, Attacks, and Assets, Malicious Software, Viruses, Worms and Bots, Rootkits

Course Objectives

After completing the course, the student must be able to:

Explain operating systems, what they do, and how they are designed and constructed.
Discuss various methods for process management and CPU scheduling.
Explain the principals involved in the internal algorithms and primary and secondary memory management structures.
Identify and discuss the protection mechanisms that operating systems may provide.

Mapping with CO, PO, and Bloom's Taxonomy

CO No.	Course Outcomes (CO) Statement	levels of Bloom's Taxonomy	Matching with Program Outcome (PO)
CO1	Describe the evolution, types, structure, and functions of operating systems.	C2	PO1, PO2
CO2	Explain techniques involved in the process, memory, device, and file management.	C2	PO2
CO3	Describe security and protection measures used in operating systems	C2	PO3
CO4	Execute Linux basic commands and shell scripts	C3	PO2
CO5	Implement processor scheduling, synchronization, deadlocks and disk allocation algorithms for a given scenario	C3	PO1, PO2

Weekly plan for course content and mapping with CO

Weeks	Topics	COs
1	Class orientation Discussion of course goals, expected outcomes, course policies, and grading system	---
2	Introduction to Operating Systems	CO1

3 & 4	Computer System Structures	CO1, CO2
5	Process Management	CO2, CO3
6 & 7	CPU Scheduling	CO5
8 & 9	**MID-TERM EXAMINATIONS**	
10 & 11	Virtual Memory	CO2
12 & 13	Memory Management	CO2
14 & 15	Disk Scheduling	CO5
16	Case Study of Different Platforms • MS-DOS • MAC-OS • UNIX/LINUX • IBM MVS/DOS • ANDROID • SYMBIAN, etc.	CO4, CO5
17 - 19	**FINAL EXAMINATIONS**	

Mapping of Course Outcomes (COs), Program Outcomes (POs), and Evaluation Methods						
Assessment Method	**Marks**	Mark distributions (as %) on COs and POs				
		CO1	CO2	CO3	CO4	CO5
		PO1 PO2	PO2	PO3	PO2	PO1 PO2
Attendance (Class Participation)	10%	-	-	-	-	-
Quiz 1/Quiz 2/Quiz 3/Quiz 4	15%	5%	5%	-	-	5%
Midterm Exam.	25%	8.33%	8.33%	-	-	8.33%
Final Exam.	50%	5%	5%	10%	10%	20%
Total	100%	18.33%	18.33%	10%	10%	33.33%

Mapping of COs and POs [Correlation level 1 for low, 2 for moderate, and 3 for high]												
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	√	√										
CO2		√										
CO3	√											
CO4		√										
CO5	√	√										

Program Outcomes	
PO 1	**Engineering Knowledge:** Apply knowledge of **mathematics, natural science**, **engineering** fundamentals and system fundamentals, software development, networking & communication, and information assurance & security to the solution of complex engineering problems in computer science and engineering.
PO 2	**Problem Analysis:** Ability to **identify**, **formulate** and **analyze complex** Computer Science and Engineering problems in the areas of hardware, software, theoretical Computer Science and applications to reach significant conclusions by applying Mathematics, Natural sciences, Computer Science and Engineering principles.
PO 3	**Design/ Development of Solutions:** **Design solutions** for complex computer science and engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO 4	**Investigation:** Ability to use **research-based knowledge** and **research methods** to perform literature survey, design experiments for complex problems in designing, developing and maintaining a computing system, collect data from the experimental outcome, analyze and interpret valid/interesting patterns and conclusions from the data points.
PO 5	**Modern Tool Usage:** Ability to create, select and apply **state of the art tools** and techniques in designing, developing and testing a computing system or its component.
PO 6	**The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to **professional engineering practice** in system development and solutions to **complex engineering problems** related to system fundamentals, software development, networking & communication, and information assurance & security.
PO 7	**Environment and Sustainability:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to **professional engineering practice** in system development and solutions to **complex engineering problems** related to system fundamentals, software development, networking & communication, and information assurance & security.
PO 8	**Ethics:** Apply **ethical principles** and commit to **professional ethics** and **responsibilities** and norms of computer science and engineering practice.
PO 9	**Individual Work and Teamwork:** Ability to function as an individual and as a team player or leader in multidisciplinary teams and strive towards **achieving a common goal.**
PO 10	**Communication:** **Communicate effectively** on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project Management and Finance:** Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team to **manage projects** and in multidisciplinary environments.
PO 12	**Life-long learning:** Recognize the need for and have the preparation and ability to **engage in independent** and **lifelong learning** in the broadest context of technological change.

Instructors contact details:

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