University of

Asia Pacific (UAP)

Department of Computer Science and Engineering (CSE)

Course Outline

Program:	Computer Science and Engineering (CSE)
Course Title:	Operating Systems
Course Code:	CSE 401
Semester:	Spring 2025
Level:	4th Year 1st Semester
Credit Hour:	3.0
Name & Designation of Teacher:	Tahira Alam Nahida Marzan , Lecturer
Office/Room:	7th Floor, teacher's compound
Class Hours:	Monday 12:30PM to 1:50PM, Thursday 12:30PM to 1:50PM(Sec: A) Wednesday 8:00AM to 9:20AM, Thursday 12:30PM to 1:50PM(Sec: D)
Consultation Hours:	**Sunday: 9:30 a.m.-11:00 a.m.(Sec-A)** **Monday: 11:00 a.m.-12:30 a.m.(Sec-D)**
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Contact:	01914876034 01538008496
Rationale of the Course:	Operating System is a key part of a computer system. Understand how computers work under the hood. Tradeoffs between performance and functionality, division of labor between HW and SW. Operating systems are key components in many systems. This course teaches the basic operating system abstractions, mechanisms, and their implementations. The core of the course contains concurrent programming (threads and synchronization), inter process communication, and an introduction to distributed operating systems.
Pre-requisite	CSE 203, CSE 317

Course Content:

Operating system overview: OS functions, evolution of OS functions, batch processing systems, single user multiprogramming systems, time sharing systems, real-time operating systems, OS structure. Processes: Process definition, process control, interacting processes, implementation of interacting processes, threads. Scheduling: job scheduling, process scheduling, process management, Scheduling algorithms, priority control. Deadlocks: Definitions, resource status modeling, handling deadlocks, deadlock detection and

resolution, deadlock avoidance. Process synchronization: Implementing control synchronization, semaphores concurrency, inter process communication. Memory management: Principles, requirements and design of memory management system, program loading and linking. Virtual Memory: locality, page table, translation lookaside buffer, segmentation. I/O Management and disk scheduling: Organization of the I/O function. Direct memory access. Design issues. I/O buffering. File management: Overview. File management systems. File organization and access, file directories. Sharing of files. File systems protection and security; design and implementation methodology.

Course Objectives (CO): The objectives of this course are:

1. **Teach** elementary and foundational Concepts of Operating System.
2. **Teach** operating system applications and their association with hardware.
3. **Demonstrate** different algorithms to handle processes to schedule for execution, allocating resources and synchronization

Course Outcomes (CO) and their mapping with Program outcomes (PO) and Teaching-Learning Assessment methods:

CO No.	CO Statements: Upon successful completion of the course, students should be able to:	Corresponding POs (Appendix-1)	Bloom's taxonomy domain/level (Appendix-2)	Delivery methods and activities	Assessment Tools
CO1	**Remember** elementary and foundational concepts of Operating Systems and their applications.	1	Remember	Lecture, Multimedia	Quiz, Written exam
CO2	**Apply** different algorithms to handle processes to schedule for execution, page replacement, allocating resources and managing deadlock, disk scheduling.	2	Apply	Lecture, Multimedia, Problem Solving, Group Discussion	Quiz, Written exam, Assignment
CO3	**Understand** the basics of system call. process synchronization(Semaphore), race condition, critical section, file system, I/0 devices.	1	Understand	Lecture, Multimedia, Problem Solving, Group Discussion	Quiz, Written exam, Assignment

Weighting COs with Assessment methods:

Assessment Type	% weight	CO1	CO2	CO3
Final Exam	**50%**	10	30	10

Mid Term	**20%**	8	5	7
Quizzes, Assignment	**30%**	10	10	10
Total	**100%**	28	45	27

Course Content Outline and mapping with Cos

Week	Topics / Content	Course Outcome	Delivery methods and activities	Reading Materials
1	Course Overview and Introduction to Operating Systems	CO1	Lecture, multimedia	1. Operating System Concept Essentials, by Silbershatz, Galvin, and Gagne, 9th Edition. 2. Modern Operating Systems, by Andrew S. Tanenbaum , Herbert Bos,4th Edition.
2	Operating System Structures	CO1	Lecture, multimedia	
3	Process Concept, PCB, IPC *(Class Test 1)*	CO1	Lecture, problem solving	
4	Threads and Concurrency	CO3	Lecture, multimedia	
5	Process Scheduling FCFS, SJF Priority, Round Robin *(Class Test 2)*	CO2	Lecture, multimedia, Problem solving	
6	System Calls	CO3	Lecture, multimedia	
7	Process Synchronization (Race condition, Critical section)	CO3	Lecture, multimedia	
8	Semaphore	CO2	Lecture, multimedia, Problem solving	
9	Deadlock *(Class Test 3)*	CO2	Lecture, multimedia,, problem solving	
10	Virtual Memory Management	CO1	Lecture, multimedia, problem solving	
11	Page replacement Algorithms	CO2	Lecture, multimedia	
12	I/O Devices Handling			
13	File System, Disk Scheduling *(Class Test 4)*	CO3	Lecture, multimedia, problem solving	
14	Review for Final Exam	All	Lecture, multimedia, problem solving	

Minimum attendance: 70% class attendance is mandatory for a student in order to appear at the final examination.

Textbook: Operating System Concept Essentials, by Silbershatz, Galvin, and Gagne, 9th Edition.

Required References: **Operating System Principles, Prentice-Hall of India, B. Hausen.**

Modern Operating Systems, by Andrew S. Tanenbaum , Herbert Bos,4th Edition.

Grading System: As per the approved grading scale of University of Asia Pacific (Appendix-3).

Special Instructions: **Plagiarism**: Copied assignments/scripts will be graded as zero.
Class Test: There will be four class tests, one of which is optional (alternative to another class test).

Prepared by (Course Teacher)	**Checked by** (Chairman, PSAC committee)	**Approved by** (Head of the Department)
Tahira Alam, Md Shahidul Islam		

Appendix-1:
Washington Accord Program Outcomes (PO) for engineering programs:

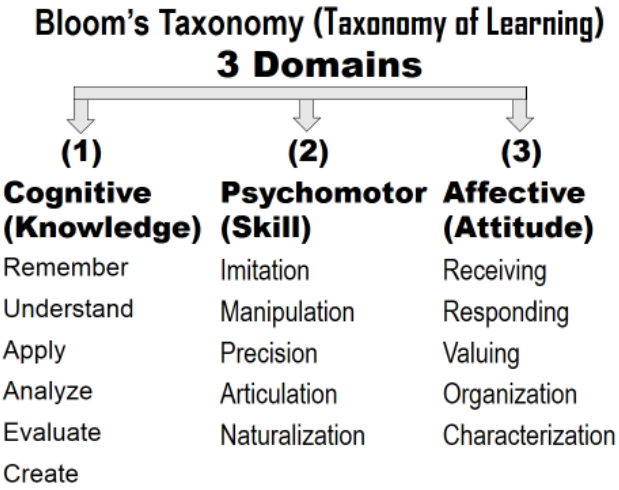
No.	PO	Differentiating Characteristic
1	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical
2	Problem Analysis	Complexity of analysis
3	Design/ development of solutions	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified
4	Investigation	Breadth and depth of investigation and experimentation
5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
6	The Engineer and Society	Level of knowledge and responsibility
7	Environment and Sustainability	Type of solutions.
8	Ethics	Understanding and level of practice
9	Individual and Team work	Role in and diversity of team
10	Communication	Level of communication according to type of activities performed
11	Project Management and Finance	Level of management required for differing types of activity
12	Lifelong learning	Preparation for and depth of Continuing learning.

Generic Skills (Detailed):

1. **Engineering Knowledge (T)** -Apply knowledge of mathematics, sciences, engineering fundamentals and manufacturing engineering to the solution of complex engineering problems;

2. **Problem Analysis (T)** – Identify, formulate, research relevant literature and analyze complex engineering problems, and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;
3. **Design/Development of Solutions (A)** –Design solutions, exhibiting innovativeness, for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.
4. **Investigation (D)** Conduct investigation into complex problems, displaying creativeness, using research-based knowledge, and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
5. **Modern Tool Usage (A & D)** -Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations;
6. **The Engineer and Society (ESSE)** -Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices.
7. **Environment and Sustainability (ESSE)** -Understand the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
8. **Ethics (ESSE)** –Apply professional ethics with Islamic values and commit to responsibilities and norms of professional engineering code of practices.
9. **Communication (S)** -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;
10. **Individual and Team Work (S)** -Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
11. **Life Long Learning (S)** -Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
12. **Project Management and Finance (S)** -Demonstrate knowledge and understanding of engineering management and financial principles and apply these to one's own work, as a member and/or leader in a team, to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship.

Appendix-2



Appendix-3
UAP Grading Policy:

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00

75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00