**6OURSE INFORMATION SHEET**

**(For Theory Based Course)**

**Session:** Spring-2025

**Course Title:** Introduction to Operating System

**Course Code:** CS-222T

**Credit Hours:** 3+0

**Semester:** 4th (A, B, C, D, E,F)

**Pre-Requisite:** Data Structures & Algorithms (CS212T)

**Instructor Name:** Mr**.** Adeel Saeed , Engr. Nawaid Hasan

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**WhatsApp Group** OS\_spring2025

**Office Hours:** Monday & Tuesday (10:00am to 11:00am)

**Mode of Teaching:** Synchronous/Asynchronous/ Hybrid/Blended

**COURSE OBJECTIVES:**

This course covers the concepts related to operating system, its services and the design of an operating system, the structure and organization of the file system, what a process is and how processes are synchronized and scheduled, different approaches to memory management.

**COURSE OUTLINE:**

Operating systems basics, system calls, process concept and scheduling, inter-process communication, multithreaded programming, multithreading models, threading issues, process scheduling algorithms, thread scheduling, multiple-processor scheduling, synchronization, critical section, semaphore, synchronization problems, deadlocks, detecting and recovering from deadlocks, memory management, swapping, contiguous memory allocation, segmentation & paging, virtual memory management, demand paging, thrashing, virtual machines, Distributed operating systems , network and distributed system structures , distributed file system.

**COURSE LEARNING OUTCOMES (CLOs) and its mapping with Program Learning Outcomes (PLOs):**

|  |  |  |  |
| --- | --- | --- | --- |
| **CLO**  **No.** | **Course Learning Outcomes (CLOs)** | **PLOs** | **Bloom’s Taxonomy** |
| 1 | **Explain** fundamental operating system concepts such as processes, threads, CPU scheduling, deadlock. | PLO\_2  (Knowledge for solving  computing problem) | C2 (Understand) |
| 2 | **Apply** different CPU scheduling algorithms and deadlock avoidance algorithm. | PLO\_3  (Problem  Analysis) | C3 (Apply) |
| 3 | **Demonstrate** process synchronization, memory management including paging, segmentation and virtual memory. | PLO\_4 (Design of solution) | C3 (Apply) |

**RELATIONSHIP BETWEEN ASSESSMENT TOOLS AND CLOs:**

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| --- | --- | --- | --- |
| **Assessment Tools** | **CLO-1** | **CLO-2** | **CLO-3** |
| **Quizzes** | **3(10%)** | **3(10%)** | **4(11%)** |
| **Assignments** | **3(10%)** | **3(10%)** | **4(11%)** |
| **Midterm Exam** | **15(48%)** | **15(48%)** | **--** |
| **Final Exam** | **10(32%)** | **10(32%)** | **30(79%)** |
| **Total** | **31(31%)** | **31(31%)** | **38(38%)** |

**GRADING POLICY:**

|  |  |
| --- | --- |
| **Assessment Tools** | **Percentage** |
| Quizzes | 10% |
| Assignments | 10% |
| Midterm Exam | 30% |
| Final Exam | 50% |
| **TOTAL** | **100%** |

**Relevant Jobs /Skills:**

* Network Engineer
* Cloud Solutions Architect
* DevOps Engineer

**Recommended Books:**

* Silberschatz, Abraham. Operating System Concepts, 9th Edition. Austin, John Wiley and Sons, 2013.

http://www.cs.nthu.edu.tw/~ychung/slides/CSC3150/AbrahamSilberschatzOperating-System-Concepts---9th2012.12.pdf

**Reference Books:**

* Stallings, William. Operating Systems: Internals and Design Principles, 7th Edition.

US, Prentice Hall, 2009.

https://repository.dinus.ac.id/docs/ajar/Operating\_System.pdf

* Tanenbaum, Andrew. Modern Operating Systems, 3rd Edition. UK, Prentice Hall, 2008. http://stst.elia.pub.ro/news/SO/Modern%20Operating%20System%20%20Tanenbaum

.pdf

**Benchmark Universities:**

International University: https://www.tru.ca/distance/courses/comp3411.html

National University: https://libguides.riphah.edu.pk/c.php?g=400821&p=2729891

**LECTURE PLAN**

**Course Title: Introduction to Operating System**

**Course Code: CS-222T**

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| --- | --- | --- | --- | --- |
| **Week**  **No.** | **Week Dates** | **Topics** | **Required Reading** | **Key Date** |
| **1** | 06-03-25    07-03-25 | Computer System Structure  Computer System Organization  OS Basics  Types of OS (Single User, Batch, Multiprogramming, Time Sharing, Real Timesharing)  Interrupts, Traps. | Silberschatz CHAP-1  pg. 4 – 33 |  |
| **2** | 10-03-25    14-03-25 | OS components  OS services  OS kernel  System calls | Silberschatz CHAP-2  pg. 55 – 78 | Assignment # 1 |
| **3** | 17-03-25    21-03-25 | Process (States, PCB, Types of Schedulers)  Process creation and termination  Commands (fork)  Cooperating processes  Producer consumer problem  Inter Process Communication and process synchronization | Silberschatz  CHAP-3  pg. 105 – 133 |  |
| **4** | 24-03-25    28-03-25 | Threads  Single and multithreaded process  Thread Scheduling  Models of threads  P thread library (create thread)  Thread example code | Silberschatz  CHAP-4  pg. 163 – 189 | Quiz # 1 |
| **5** | 31-03-25    04-04-25 | CPU Scheduling  Short term scheduler  Dispatcher  Scheduling algorithms (FCFS,SJF)  Scheduling algorithms (SRTF, RR) | Silberschatz -  CHAP-6  pg. 261 - 285 |  |
| **6** | 07-04-25    11-04-25 | Scheduling algorithms multilevel queues Multilevel feedback scheduling Estimation of next CPU burst | Silberschatz -  CHAP-6  pg. 300 - 311 | Assignment # 2 |
| **7** | 14-04-25    18-04-25 | Deadlock  System Model  Deadlock Prevention Deadlock  Avoidance | Silberschatz -  CHAP-7  pg. 315 - 337 | Quiz # 2 |
| **8** | 21-04-25    25-04-25 | Deadlock  System Model  Deadlock Prevention | Silberschatz -  CHAP-7  pg. 315 - 337 |  |
|  |  | **Midterm Examination** **(28-04-25 to 03-05-25)** | |  |
| **10** | 05-05-25    09-05-25 | Process Sychronization  Conditions for the good solution of critical section | Silberschatz -  CHAP-5  pg. 219 - 237 |  |
| **11** | 12-05-25    16-05-25 | 2-process critical section  (Peter’s solutions) | Silberschatz -  CHAP-5  pg. 219 - 237 |  |
| **12** | 19-05-25    23-05-25 | Process Sychronization  n-process  critical section (Bakery Algorithm) | Silberschatz  CHAP-5  pg.238 – 242 | Assignment # 3 |
| **13** | 26-05-25    30-05-25 | Main Memory  Best Fit ,First Fit, Worst Fit Algorithms | Silberschatz  CHAP-8  pg. 360 – 364 |  |
| **14** | 02-06-25    06-06-25 | Main Memory(cont.)  Contiguous Memory Allocation Paging | Silberschatz  CHAP-8  pg. 360 – 364 |  |
| **15** | 09-06-25    13-06-25 | Paging(cont.)  Structure of the Page Table  Segmentation  Structure of the Page Table | Silberschatz  CHAP-8  pg.366– 378 | Quiz # 3 |
| **16** | 16-06-25    20-06-25 | Demand Paging  Virtual Memory  Virtual Machines (Design, issues and implementations) | Silberschatz -  CHAP-9  pg. 397 - 422 |  |
| **17** | 23-06-25    27-06-25 | Distributed operating systems  Network and distributed system structures | Silberschatz -  CHAP-17  pg 741- 770 |  |
| **18** | 30-06-25    04-07-25 | Distributed coordination  Remote services  Distributed File Systems | Silberschatz -  CHAP-17  pg 741- 770 |  |
|  | | **Final Examination**  **(08-07-25 to 19-07-25)** | |  |

**Teacher’s Name and Signature: Engr. Nawaid Hasan Date: 04-03-2025**

**Chairperson’s Name and Signature: Dr. Waleej Haider Date: 04-03-2025**