Department of Computer Science

College of Science

University Of Salahaddin

Subject: - operating systems

Course Book first course– (Year -4- CS & IT)

Lecturer's name: - (MSc) Lana Latif Nahmatwlla

Academic Year: 2023/2024

Course Book

1. Course name	Operating Systems
2. Lecturer in charge	**Lana Latif Nahmatwlla**
3. Department/ College	**Computer/College Of Science**
4. Contact	**e-mail:** lana.nahmatwlla@su.edu.krd
5. Time (in hours) per week	**Theory: 2**
6. Office hours	**Office hours (for students): Thursday (12 – 2)**
7. Course code	
8. Teacher's academic profile	**Teaching:** - Attended OOP labs in 2015 as a teaching assistant - Attended Computer science labs in 2014 as a teaching assistant - Attended Programming Language labs in 2011 as a teaching assistant - Attended OS labs in 2011 as a teaching assistant - Attended data structure labs in 2011 as a teaching assistant - Attended data based Labs in 2014 **Research interest:** My research interest is in Operating Systems **Supervision**: I am currently supervising 2 fourth year students' project. Their project title is "3D LIGHT SYSTEM " **Past Projects**: My MSc project was on "Pipelined Parallel Processing Implementation based on Distributed Memory Systems"
9. Keywords	Kernel, shell ,System Calls ,System Boot ,System Programs, process, Multithreaded, CPU Scheduler, Disk Scheduling, File Sharing, Co-operating Processes. File Management, Multitasking

10. Course overview:

OS purposes: resource management and the extended virtual computer; historical development. Processes: critical sections and mutual exclusion, semaphores, monitors, classical problems, deadlock; process scheduling. Input and Output: hardware and software control. Memory management: multi-programming; swapping; virtual memory, paging and segmentation; File System: operations, implementation, and performance. Operating System Security and Protection mechanisms: protection domains, access lists, capability systems, principle of minimum privilege, security threats and attacks, encryption. This course introduces students to a broad range of operating system concepts, including installation and maintenance. Emphasis is operating system concepts, management, maintenance, and resources required. Linux and Unix Operating system are so important to be studied because this operating system are used in world in wide range because of their security, free cost of the operating system and open source. The course will cover all the concept of programming of Shell Programming and how to create directory and open files by using Unix.:

11. Course objective:

- Students will demonstrate a knowledge of process control, threads, concurrency, memory management scheduling, I/O and files, distributed systems, Security, networking.
- To provide a general explanation of the component of operating systems
- To provide the general organization of the computer systems and the relation between the computer structure and operating systems.

12. Student's obligation .

- There will be two main theoretical and practical exams plus a number of quizzes in the lab. The quizzes will be calculated as one exam mark.

13. Forms of teaching

-Using power point and data show.
-Using White board , Videos and images

14. Assessment scheme

Assessments:-

- **First Semester exam**

- At the end of the autumn semester Theoretical exam will be out of 15

Examinations

- Final exam **Theoretical** %50

15. Student learning outcome:

In the end of the course student should be able to

- Describe the general architecture of computers and describe, contrast and compare differing structures for operating systems
- Understand and analyse theory and implementation of: processes, resource control, physical and scheduling, I/O and files.
- Be familiar with multithreading.
- Students will understand the concepts of memory management including virtual memory
- Be familiar with protection and security mechanisms.
- Help students understand the Operating System for Mobile and some kinds of Mobile Applications
- understanding the issues that related to file and implementation, disk management
- Be familiar with various types of operating systems including Linux

- comfortably use basic Linux commands from the command line (from a terminal window);
- usefully combine Linux tools using features such as filters, pipes, redirection, and regular expressions;
- be knowledgeable enough about basic Linux shell scripting to be able to successfully read and write bash shell scripts;
- Know how to use Linux resources to find additional information about Linux commands.

16. Course Reading List and References:

1. Abraham Silberschatz .,Operating System Concept. 7ed. USA: John Wiley & Sons, Inc. 2005.
2. Abd-El-Barr. and H. El-Rewini, Fundamentals of Computer Organization And Architecture. New Jersey: John Wiley & Sons, Inc, 2005.

Other relevant papers, websites and books.

17. The Topics:	Lecturer's name
1. Introduction to operating systems, Computer System Structure ,Types of OS	1st Week
2. Operating System Historical Review, Mainframe systems stages, Types of Multiprocessor Systems, Types of Clustered Systems, and Computing Environments.	2nd Week
3. Operating System Structure, Kernel & Kernel Function, Operating System Operations	3rd Week
4. Operating System Services ,System Calls ,System Programs ,System Boot ,Virtual Machine	4th Week & 5th Week
5. Definitions of process ,	
6. Process Concept ,Process State	
7. Process Scheduling	6th week&7th Week
8. Context Switch	
9. Operation on Processes	
10. Co-operating Processes	
11. Inter process Communication	
12. Definitions of Threads	
13. Multithreading Models	8th week&9th Week
14. Threading Issues	
15. Signal Handling	
16. Thread Pools	
17. Lightweight Processes	
18. Windows XP Threads	
19. CPU Scheduler	
20. Basic Concepts	10th Week ,11th week &12th week
21. CPU Scheduler	
22. Dispatcher	
23. Scheduling Criteria	
24. Scheduling Algorithms	
25. Multiple-Processor Scheduling	
26. Multicore Processors	
27. Simple Memory Management System	
28. Binding of Instructions and Data to Memory	13th Week, 14th week

29.Swapping 30.Memory partitions 31.Fragmentation 32.Paging 33.Segmentation 34.Memory protection exam	**15th Week**

19. Examinations:

1. Compositional:-

-What is System Calls?

-What are the advantages and disadvantages of Multiprocessor Systems?

-What is context switch? Briefly Explain?

2. True or false type of exams:-

*Determine whether the following statements are true or False and **Correct** the false one.*

1. System calls provide the interface between a process and the operating system.
2. In Asymmetric multiprocessing (AMP) each processor is self-scheduling.

3. Write A shell Program To Greet Based On Time of the System.

20. Extra notes:

21. Peer review

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