CS3500: Operating System

July-Nov Semester 2022
'D' Slot;
Slots: Mon (11:00–11:50), Tue (10:00-10:50)
Wed: (09:00–09:50) and Thus (01:00–01.50)

LAB: Fri: (02:00-04:45)

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Updated on July 20, 2022

Note: The course webpage is http://www.cse.iitm.ac.in/~vplab/os.html. A google group will be formed for course related communications; please check the e-mail regularly.

1 Course Objectives

The course introduces operations systems (OS) to under graduates. This course has two components: a theory component to teach you the concepts and principles that underline OS, and a practice component to relate theoretical principles with operating system implementation. The students would be able to understand the working of an operating system, how it interfaces with computer hardware, and the various interfaces which software can use. Additionally, students will learn to appreciate design aspects of the OS.

2 Learning Outcomes

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know memory concepts and learn secondary memory management.

3 Course prerequisite(s)

Basic knowledge of Data Structures and Computer Organization.

4 Classroom Mode

Traditional offline lectures (3 * 50 mins slots per week) with slides and 2 hours lab each week. Tentatively, every alternate week tutorials are planned to be conducted within these slots, resulting in about 5-6 tutorials/quiz. Few extra hours of learning may be required.

5 Textbooks

- Avi Silberschatz and Peter Baer Galvin and Greg Gagne. Operating System Concepts (10th Edition). Wiley, 2018.
- Stallings, William, and Goutam Kumar Paul. Operating systems: Internals and Design Principles (9th Edition). Vol. 9. New York: Pearson, 2018.

6 Reference Books

- Tanenbaum, Andrew S. Modern Operating Systems. Upper Saddle River, N.J.: Pearson Prentice Hall, 2008.

7 Course Requirements

You are required to attend all the lectures. If you miss any of them it is your responsibility to find out what went on during the classes and to collect any materials that may be handed out. Class participation is strongly encouraged to demonstrate an appropriate level of understanding of the material being discussed in the class. Regular feedback from the class regarding the lectures will be very much appreciated.

8 Planned Syllabus

- Basics: OS Functionalities, Types of OS, Computer Architecture support to OS
- Process and Threads: Process Scheduling – Uniprocessor scheduling algorithms, Multiprocessor and Real-time scheduling algorithms, threads
- Synchronization -Peterson's Solution, Bakery Algorithm, Hardware Support to Process Synchronization, Semaphores, Critical Regions, Monitors - Deadlock prevention, avoidance & detection and Recovery – Bankers Algorithm.
- Memory Management: Segmentation and space allocation, Basics of linking and loading, Demand Paging, Page replacement algorithms, Analysis of page allocation policies - Working Set
- File Systems: Contiguous, Sequential and Indexed Allocation, File system interface, File System implementation
- Device drivers - block and character devices, streams, Character and Block device switch tables
- Protection and Security : Accessibility and Capability

- Case study of Linux and Window

9 Tentative Grading Policy

The following allocation of marks is tentative. The flexibility will be used to the benefit of average grades for the entire class.

Mid-Sem (Quiz)	15
Tutorials	10
Lab Assignments	25
End-Sem	50
Total	100

10 Tentative Schedule (Dates)

Tentative dates of activities throughout the semester:

Mid Sem (Quiz 1)   24/09/2022

Tutorial* Dates   TBD

Extra Classes   TBD

End Semester Exam   As per institute regulations

* Tutorials will be conducted offline in closed book mode.

11 Academic Honesty & Misc

Academic honesty is expected from each student participating in the course. NO sharing (willing, unwilling, knowing, unknowing) of assignment code between students, submission of downloaded code (from the Internet, or anywhere else) is allowed.

Academic violations will be handled by IITM Senate Discipline and Welfare (DISCO) Committee. Typically, the first violation instance will result in ZERO marks for the corresponding component of the Course. Grade and a drop of one-penalty level in final course grade. The second instance of code copying will result in same as above for marks but drop of two levels of final course grades at end of semester. The DISCO Committee of IIT Madras will also be intimated of the matter.

Please protect your Moodle account password. Do not share it with ANYONE. Do not share your academic disk drive space on the Campus LAN.

Each proxy in the attendance will be penalized by 5% of (absolute) marks. It becomes 2% each for the donor & beneficiary, if both accept the fault.

Tutorials are not exams. Occasional exchange of technical ideas is permitted, but not copying. No complaints of copying will be entertained after the tutorial. If you find anybody copying, immediately inform the TAs present. If guilty, their submissions will not be evaluated and they will obtain zero marks for that tutorial.

Based on CSE-DCC approval, re-evaluation of offline End Sem exam papers will only be done after the institute reopens post-vacation, after discussion of doubts in presence. Only minor clarifications, totalling errors, any missed corrections will be considered till that time.