

Date: Friday, May 5
1:05pm to 3:05pm; please be there by 1pm

Location: PM 31 (usual classroom)

Format:

The final exam will consist of 5-8 questions.

It will be **closed book, closed notes, closed computer/without wireless access**. However, you are **allowed to bring one letter-sized sheet of paper with prepared notes** (you may use front and back of that sheet.)

The Wednesday, May 3 lecture will be dedicated to a review for the final. Bring your questions.

You are responsible for the content of lectures 1 through 41. This includes, among others:

- Introduction to OS: general goals & principles of operating systems.
- Threads & processes: context switching, mode switching, procedure switching, context management, threading & process APIs.
- Concurrency & Synchronization: critical section problem, race conditions, approaches for guaranteeing mutual exclusion, including locks, semaphores, monitors, spinlocks & disabling interrupts.
- Deadlock: conditions, detection & recovery.
- Scheduling: general goals & constraints, priority scheduling, FCFS, RR, SPN, MLFQS, Lottery Scheduling. Real-time Scheduling: RMA & EDF.
- Virtual memory basics: address translation, memory protection, page table & TLB management; physical memory management: buddy systems and bitmap-based allocation; virtual page replacement strategies, working set & thrashing; segmentation.
- Threading models: user-level threads, kernel-level threads, hybrid models.
- Disks & Filesystems: disk characteristics, buffer cache, general design of filesystems, file allocation & layout strategies including indexed files, directory representation and lookup, consistency in filesystems, write-ordering & journaling, virtual filesystem interfaces, volume management, RAID.
- Security & Protection: basic models and goals.

- Networking: packet-switched vs. circuit-switches networks, sources of delays, layered architectures, TCP/IP model & addressing, BSD sockets.

Stallings covers this material in Sections 2.1-2.4, 3.1-3.4, 4.1, 5.1-5.4, 5.6-5.7, 6.1-6.2, 6.4, 6.6-6.11, 7.1-7.4, 8.1-8.2, 9.1-9.4, 10.2., 11.1-11.6, 11A, 12.1-12.7, 13, 16.1-16.5.

The final may contain questions related to projects 0-4.