



# Exam Review

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Operating Systems  
CS 3430

# [ Coverage ]

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- Total: ~50 points; 1 min / point
- Based on lectures 1-13, suggested exercises 1-4
- Multiple choice, short answer, and problem solving questions

# [ Introduction and History ]

- Definitions
  - Operating system
  - Job
  - Batch system
  - Timesharing

# [ Introduction and History ]

- Definitions
  - Multiprocessing
  - Multithreading
  - Multitasking
  - Multiprogramming
  - Uniprogramming

# [ Introduction and History ]

- Short answers
  - Four phases of OS history
    - OS design goals

# [ Concurrency: Threads, Address Spaces, and Processes ]

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- Definitions
  - Thread
  - Address space
  - Process
  - Context switch

# [ Concurrency: Threads, Address Spaces, and Processes ]

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- Short answers
  - Benefits of concurrency
  - Thread vs. process
  - Dispatching loop
  - Thread state diagram

# Genesis: From Raw Hardware to Processes

- Definitions
  - Master boot record
  - System call
  - User mode
  - Kernel mode
  - Trap instruction



# Genesis: From Raw Hardware to Processes

- Short answers
  - Booting sequence
  - System call sequence
  - Process creation
  - init process

# [ CPU Scheduling ]

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- Definitions
  - Starvation

# [ CPU Scheduling ]

- Short answers
  - Preemptive vs. nonpreemptive scheduling
  - FIFO
  - RR
  - SJN
  - SRTF
  - Multilevel feedback queues
  - Lottery scheduling

# [ Cooperating Threads ]

- Definitions
  - Atomic operation
  - Race condition

# [ Cooperating Threads ]

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- Short answers
  - Independent threads
  - Cooperating threads
  - Decision tree

# [ Synchronization ]

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- Definitions
  - Mutual exclusion
  - Critical section

# [ Synchronization ]

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- Short answers
  - Code verification (e.g. how to test a locking solution)

# Implementing Mutual Exclusion

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- Definitions
  - Busy waiting



# Implementing Mutual Exclusion

- Short answers
  - Ways to implement locks
    - Interrupt disables
    - test\_and\_set operation
    - Atomic memory load and store
    - Wait queues

# Semaphores and Bounded Buffer

- Definitions
  - Semaphore

# Semaphores and Bounded Buffer

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- Short answers
  - Semaphores vs. integers
  - Two uses of semaphores
  - P() and V() functions

# [ More on Semaphores ]

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- Definitions
  - Safety
  - Liveness
  - Fairness

# [ More on Semaphores ]

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- Short answers
  - Code verification