

A decorative graphic featuring a thin gold circle on the left side. A thick black left square bracket is positioned to the left of the circle, and a thick gold right square bracket is positioned to the right of the circle. A horizontal gold bar with a gradient, transitioning from a darker shade on the left to a lighter shade on the right, spans across the middle of the slide, partially overlapping the circle and brackets.

# Midterm Exam Review

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Operating Systems

COP 4610

# [ Coverage ]

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- Total: 100 points;
- Attendance: 18 points;
- 5 points based on OS Introduction and Structure
- 50 points based on CPU Scheduling
- 19 points based on Mutual Exclusion
- 6 points based on Synchronization
- 2 points based on Deadlocks

# [ Introduction and History ]

- Four phases of OS history
  - OS design goals
    - Time Sharing System
    - Batch System
  - Today's design trends

# [ OS Architecture ]

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- Dual-Mode Operation
- Address space

# [ CPU Scheduling ]

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- Creation of The First Process
  - Booting sequence
- Per-thread State Diagram

# [ CPU Scheduling ]

- Scheduling Strategy

- FIFO
- RR
- SJN
- SRTF

- Definition

- Response Time
- Turnaround Time
- Wait Time

# [ Mutual Exclusion ]

## ■ Definitions

- Atomic Operation
- Race Condition
- Race Condition
- Mutual Exclusion
- Synchronization
- Critical Section
- Busy Waiting

# [ Mutual Exclusion ]

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- Multi-Threaded Race Condition Problem



# [ Mutual Exclusion ]

- The Working Mechanism, Advantages, and Disadvantages
  - Lock
  - Spinlock
  - Mutex
    - 80% of the exam questions will be based on assignments
    - 20% of the questions will test your ability to apply principles learned specifically in this section

# [ Synchronization ]

- Producer-Consumer problem
  - Condition Variables
  - Pthread\_cond\_wait
  - P operation and V operation
- Semaphore
  - Advantages
  - Disadvantages

# [ Deadlocks ]

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- Deadlocks
  - Condition
- Defensive Programming
  - assertion