

## CSE330: Operating Systems – Syllabus

### Catalog Data:

Operating system structure and services, processor scheduling, concurrent processes, synchronization techniques, memory management, virtual memory, input/output, storage management, and file systems.

### Textbook:

Recommended: A. Silberschatz, P.B. Galvin, G. Gagne, Operating System Concepts, John Wiley & Sons . *Older editions are fine.*

**Web page:** Linked to <http://parthad.com> (also check the link for Class Policies)

### Course Objectives

An introduction to the concepts of design, implementation and operation of computer operating systems. Students will learn about processes, threads, scheduling, memory management, file systems with particular emphasis to concurrency, parallelism and multi-core architectures.

### Evaluation:

Students are assessed on grades received in projects, homeworks, exams. The grades are “curved” for determining grade cutoff points on an A, B, C scale. The weight distribution is Assignments: 30%; Mid-Term Exams: 35%; Final Exam: 35%.

There will be **no makeup**, such as extra credit work, extra credit exams and/or other methods beyond what all students are expected to do. Extra credit warps class rankings.

### Academic Integrity:

You are responsible for understanding what consists academic dishonesty. No tolerance policy will be in effect and a grade of F or XE will be awarded and a report will be filed with Fulton School. Please refer to <https://provost.asu.edu/files/AcademicIntegrityPolicyPDF.pdf> for details -- also please note item N on Page 2.

### Course Outcomes:

After the course the student will be able to:

1. Understand the underlying motivation for having operating systems.
2. Understand processes threads and scheduling of cores to programs.
3. Understand the issues of scheduling of user-level processes/threads.
4. Understand the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
5. Understand the concepts of deadlock in operating systems and how they can be prevented, avoided and detected.
6. Understand virtual memory management.
7. Understand device and peripheral management, device drivers and scheduling

## 8. Understand file systems

### **Topics:**

#### Introduction to Operating Systems:

- History
- Efficiency and Convenience

#### Operating System Services

- System Architecture
- System Calls
- Resource Management

#### Security and Operating System Operation

- Protection – user and kernel modes
- Booting and Secure Booting of OS
- Patching of Vulnerabilities and Vulnerability Windows
- Installations, Configurations and Kernel Modules

#### CPU Scheduling Concepts

- Context Switching
- Multi-Processing
- Long and Short Term Scheduling
- Comparison of Scheduling Algorithms
- Timesharing Concepts

#### Concurrent Processes

- Concurrency
- Race Conditions
- Mutual Exclusion and Synchronization
- Synchronization Techniques

#### Concurrent Programming

- Semaphores
- Concurrent Programming Paradigms
- Readers/Writers, Dining Philosophers
- Language Support: Regions and Monitors
- Message Passing.

#### Memory Management:

- Memory Allocation protocols
- Paging/Segmentation
- Virtual Memory
- Demand Paging
- Page Replacement

## Deadlock Handling

- Deadlock Concepts and Conditions
- Avoidance and Prevention
- Banker's Algorithm

## Device Management:

- Disks and Peripherals
- Device Drivers
- Disk Scheduling

## File Systems

- File Naming
- Directory Management
- File Access Methods
- Protection

**Title IX** is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.