

**Course Designator/ Course Number:** ComS 552

**Course Title:** Operating Systems: Advanced Concepts

**Course Length:** 45 hours in 15 weeks, 2 90-minute meetings per week

**Course Description:**

A comparative study of high-level language facilities for process synchronization and communication. Formal analysis of deadlock, concurrency control and recovery, and system performance. Protection issues including capability-based systems, access and flow control, encryption, and authentication.

**Recent Text:**

"Advanced Concepts in Operating Systems" by M Singhal and N. Shivaratri, McGraw Hill, 1994 Edition

**Course Learning Objectives:**

Upon completing this course a student will:

1. Be able to learn about the various design issues and the development of an operating system.
2. Understand the concurrency and synchronization problems and be able to provide solutions to these problems
3. Understand the deadlock issues in both the centralized and distributed operating systems
4. Understand the Access Control, Capability Based Control, Authentication Mechanism, Information Flow Control and Cryptographic Algorithms that are used in Modern Operating Systems
5. Be able to design and develop client and concurrent server software using remote procedure call (RPC) and Multithreaded software package
6. Gain the knowledge on the latest research and development results in operating system design and development.

**Major Topics:**

- Introduction
- Process Synchronization and Communication
- Process Deadlock
- Distributed Operating Systems and Remote Procedure Calls
- Theoretical Foundations
- Distributed Mutual Exclusion
- Protection and Security

Cryptography  
Database Operating Systems  
Concurrency Control  
System Failure and Recovery  
Distributed File Systems

**Method of Instruction:**

Lectures plus interactive group and team work on oral presentation on special topics and programming projects.

**Evaluation Methods:**

The grade comprises:

Homework and in-class quizzes: 20%

Term Paper : 10%

Programming Project : 20%

2 Exams : 50%

**Student Enrollment:**

Taught each spring. Typical enrollment:

40 students per year