COMP 3430 - Operating Systems

Calendar Description: Operating systems, their design, implementation, and usage (Lab required).
Prerequisite: COMP 2140 and COMP 2280
Recommended: COMP 2160
This course is a prerequisite for: COMP 4430, COMP 4510, COMP 4550 and COMP 4580

Outline

1) Introduction (1 week)
    Definitions and Basic Concepts, Motivation for Studying Operating Systems (OSs), OS interaction with Hardware and Applications
2) Processes and Threads (1 week)
    Concurrent Execution of Programs, Processes vs. Threads, Process States and Implementation
3) Synchronizing Concurrent Processes/Threads (2 ½ weeks)
    Motivation, Mutual Exclusion and Critical Sections, Hardware Support for Synchronization, Classic Synchronization Problems, Semaphores and Monitors
4) Inter-process Communication (1 ½ weeks)
    Motivation, Shared Memory, Message Passing, Relation to Synchronization
5) CPU Scheduling (1 ½ weeks)
    Need for Scheduling, Types of Schedulers, Preemptive vs. Non-Preemptive Scheduling, Classic Scheduling Algorithms and their Properties
6) Deadlocks (1 week)
    Definition and Necessary and Sufficient Conditions, Resource Allocation Graphs Deadlock Prevention, Avoidance and Detection and Recovery
7) Memory Management: Basic Concepts (2 weeks)
    Issues in Sharing Memory and a Process' Memory Image, Static vs. Dynamic Partitioning of Memory, Dynamic Address Translation, Segmentation and Paging
8) Virtual Memory (1 ½ weeks)
    The Concept and its Benefits, Fault Handling, Replacement Strategies
9) File Systems (1 ½ weeks)
    The File Abstraction, Types of Files, File System Implementation
10) Protection and Security (time permitting)
    Protection vs. Security, Policy vs. Mechanism, Example Problems and Sample Solutions

Recommended Text: Gary Nutt, *Operating Systems: A Modern Perspective, 2nd Edition, Lab Update*, Addison-Wesley Publishers.