CSE 4001 Operating Systems Concepts (3 credits)

Primary instructor: Eraldo Ribeiro **Supporting instructor:** Marius Silaghi

Textbooks and references:

A. Silberschatz, Operating System Concepts, 8th edition. John Wiley & Sons, 2009. (T)

Course information:

2014–2015 Catalog description: CSE 4001 Operating Systems Concepts (3 credits). Examines the design and implementation of operating systems. Includes process, storage and recovery management. Explores issues involved in moving from single-user systems to multitasking, multiprocessing and multiprocessor systems. Prerequisites: CSE 2050, CSE 3101 or ECE 2552, ECE 3551.

Prerequisites by topic: Implementation of simple data structures, memory management in programs, the C++ and Java programming languages, the Unix operating system environment

Place in program: Required.

Course outcomes & related student outcomes: The student will be able to

1. Explain operating system concepts, such as process, memory, and file management. (1: Fundamental knowledge)
2. Apply knowledge of process creation and management in the construction of programs that create new processes and share data between them. (4a: Skillful software construction)
3. Understand process synchronization issues and some of the available tools and techniques for providing synchronization and mutual exclusion. (2: Scientific, computing, and engineering problem solving)
4. Understand the causes of deadlocks and some of the available solutions for preventing or resolving deadlocks. (2: Scientific, computing, and engineering problem solving)
5. Understand and analyze performance issues related to scheduling, page replacement, memory allocation, and file allocation algorithms. (4c: Trade-offs in design choices)
6. Understand the benefits aud limitations of paged or segmented memory allocation and virtual memory systems and perform simple analysis on the performance of page allocation algorithms. (4c: Trade-offs in design choices)
7. Understand file system organization and common directory structures. (1: Fundamental knowledge)
8. Understand how current operating systems (e.g., Windows and Linux) implement some of the operating system concepts discussed in class (e.g., memory allocation, file systems, process control).(2: Trade-offs in design choices)
9. Use current operating systems (e.g., Windows and Linux). (3: Skillful use of tools)

Topics covered:

1. Overview and definitions of operating systems (1 hour)
2. Computer system structures and computer system operation (2 hours)
3. Operating system structures and services: system calls and system programs (2 hours)
4. Process management: process concept and process scheduling, cooperating processes, and interprocess communication (3 hours)
5. Threading concepts and multithreading models (2 hours)
6. CPU scheduling algorithms (2.5 hours)
7. Process synchronization, critical sections and synchronization, and semaphores (3 hours)
8. Deadlocks, methods for handling deadlocks: prevention, avoidance, detection, and recovery (3 hours)
9. Memory management, memory allocation, paging, and segmentation (2.5 hours)
10. Virtual memory and demand paging, page replacement algorithms, and frame allocation (2.5 hours)
11. File-system concepts, access methods, and directory structures (2 hours)
12. File-system structures, allocation methods, and free-space management (3 hour)
13. I/O hardware and application I/O interface (2 hours)
14. Mass-storage structure, disk scheduling, and disk management (3 hours)

Approved by: Eraldo Ribeio, Associate Professor & Marius Silaghi, Assistant Professor

Signature:  **Date:** 02/02/2015

Signature: _____ **Date:** 02/04/2015