**Exam I topics: CSCI 340**

You are responsible for **all material in chapters one through three** of the text as well as all material covered in class.

The exam may include multiple choice questions, true/false questions, fill-in-the-blank questions, matching questions (especially for definitions), diagrams, short answers and not-so-short answers (a brief essay or written explanation). In various sections, you may be able to choose from among a number of question choices. Familiarize yourself with the important terms, which appear in the text in blue font. I suggest that you review the homework assignments (and other questions) as a means of preparing for the exam. Make sure you have the latest version of the slides.

Chapter 1: Introduction: Boot process. Interrupt processing. Storage hierarchy (Fig. 1.6). I/O operations: programmed and interrupt-driven I/O and DMA (Fig. 1.7). Program and process. Multiprocessor and multicore systems; clustered systems. Difference between multiprogramming and multiprocessing and between simultaneous execution and concurrent execution. Interrupt-driven nature of operating systems. Software (trap; synchronous) and hardware-generated (asynchronous) interrupts. Dual-mode operation; modes of operation (Fig. 1.13). Privileged and non-privileged instructions. System calls. Timer and time-of-day clock. Process management. Caching. Kernel; kernel data structures. Virtualization; emulation; cloud computing. Interrupt handling; enabling and disabling of interrupts in an interrupt handler. You may need to review the material in Chapter 12 on I/O Systems.

Chapter 2: Operating System Structures: Operating system services (Fig 2.1). System call; synchronous and asynchronous systems calls. system call interface (Fig. 2.6); the standard C library. Why applications are OS-specific. Policy and mechanism. Message-passing and shared memory models of communication. Systems programs. Simple, layered and microkernel approaches to operating system structure; modules; hybrid systems. Operating system generation. System boot.

Chapter 3: Processes: Process, reentrant (pure) code. Process states (Fig. 3.2); PCB; thread, degree of multiprogramming; I/O-bound and CPU-bound processes. Scheduling queues (Fig. 3.4 - 3.6), Schedulers; process mix (Fig. 3.7); swapping. Context switching. Operations on processes; process creation and termination. The fork operation. Inter-process communications; shared memory and message passing. Direct and indirect communication. Blocking (synchronous) and non-blocking (asynchronous) calls; rendezvous. Communications in client-server systems; unreliable nature of Internet and use of TCP to provide reliable communications, pipes; ordinary pipes; named pipes; sockets; RPCs.