Midterm Topics: Computer Science 415 Spring, 2015

This information is provided to guide your study for the exam. It is only guidance; other topics may appear and some of the topics on the list below may not appear. After I have created the exam, I will post any further revisions to the information below.

The midterm will be held on April 17.

The exam may include multiple choice questions, true/false questions, fill-in-the-blank questions, matching questions (especially for definitions), short answers and not-so-short answers.

You are responsible for **all material in Chapters Three through Five with the exception of topics excluded in the syllabus,** as well as all material covered in the lectures and **Labs 2 and 5 - 8**. I suggest that you be familiar with all bolded terms in the text.

It would be a good idea to review relevant videos from the [Coursera MOOC](http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html).

The following is a list of topics from the text and lectures. Please bring any discrepancies between this list and the syllabus to my attention.

Chapter 3: ~~The Data Link Layer: Design issues. Services provided to the network layer.~~ ~~Connection-oriented and connectionless services. Framing: Bit and byte stuffing. Frame format (slides 9 and 59).~~ Frame and ack timers. ~~Error control; flow control~~. ~~Error detection and correction: redundancy, Forward Error Control (FEC).~~ ~~Error detecting codes: parity, checksum and Cyclical Redundancy checks (CRC). Latency, delay and rate. Bandwidth-delay product. Pipelining. Network interface (NIC) card. Stop-and-wait protocol. ARQ~~. ~~The PPP frame format (Fig 3.24 and surrounding paragraphs).~~

Chapter 4: ~~The Medium Access Control Sublayer: Contention. CSMA; CSMA/CD. Wireless LANs: MACA; hidden and exposed terminals. Classic (non-switched) Ethernet; collision domain and collision window; repeaters,~~ segments and LANs. ~~Star-wired bus (physical vs. logical organization).~~ Frame structure~~. Hubs and switches; Fast Ethernet. What happens to the minimum frame size when we upgrade from 10 Mbps Ethernet to Fast Ethernet, and why. Full-duplex Ethernet. Gigabit Ethernet. Data link layer switching; bridges; flooding; backward learning; transparent bridges; promiscuous mode; the spanning tree algorithm; collision domain~~. VLANs. Lab 2.

Chapter 5: The Network Layer. The end-to-end argument. Packet switching; switched and permanent virtual circuits; datagrams. Comparison of virtual-circuit and datagram networks, including Fig. 5-4. Role of the router. Routing and forwarding. Session routing; non-adaptive (static) and adaptive algorithms. Distance Vector Routing (RIP); Link State Routing; comparison of Distance Vector Routing and Link State Routing. Comparison of routing and bridging (slides 113 – 116). Hierarchical, broadcast, multicast and anycast routing. Internetworking; how networks differ; Fig. 5-39. Tunneling; Fig. 5-40 and 5.40. Packet fragmentation. The IP protocol. You should understand the IP header at a conceptual level. Classful and classless IP addresses; network, subnet and host portions of address; prefix; subnets and the subnet mask. Address aggregation; longest matching prefix. How packets are routed within a subnet (summarized from text on slide 44). Network Address Translation (NAT); see NAT exercise on BB site. IP V6 goals. ICMP. The Address Resolution Protocol (ARP); Fig. 5-61. DHCP. Label switching and MPLS. Interior and exterior protocols; autonomous systems. OSPF; Border Gateway Protocol (BGP). Skip all sections as directed in the syllabus. Labs 5 through 8.

Some terms: Transparency; interface; protocol.