The final will cover material on the network and link layers and wireless networks from the course textbook (Kurose and Ross, Computer Networking: A Top-Down Approach, 7th ed., Addison Wesley, 2017). The textbook is denoted [CNTDA]. I strongly suggest you buy a physical copy of [CNTDA] if you haven’t already; I find it’s easier to read on paper. The final material is from Chapters 4–6 in [CNTDA] (Sects. 6.1–6.3) and the corresponding lecture slides. (If you have the 7th edition, the material includes Sects. 7.1–7.3 due to the book’s reorganization.) Some material is from [CNTDA]’s companion website, http://wps.pearsoned.com/ecs_kurose_compnetw_6/; click on the link, Student Resources, then Material from Previous Editions. You need to register an account with the publisher using the scratch-off code on your book’s inside front cover before you can read this material. “Material from previous editions” on PPP and Frame Relay will help. Other good free references are:

- Peter L. Dordal’s book An Introduction to Computer Networks (http://intronetworks.cs.luc.edu/); this book is denoted [ICN].

Below, § means Section; §§ means Sections. Sections are given for [CNTDA]’s 6th edition and 7th edition, respectively. For example, (§4.5 or §5.1) means read §4.5 if you have the 6th edition; read §5.1 if you have the 7th.

Chap. 4: Network Layer (6th ed.); Sects. 4.1–4.3, 5.1–5.3 (7th ed.)
- Introduction (§4.1): know the distinction between forwarding and routing; router’s forwarding table; connection setup; network service models (best-effort vs. guaranteed)
- Virtual circuit and datagram networks (§4.2): know the distinction between them; prefixes; longest prefix matching
- Router internals (§4.3): forwarding plane and control plane; input processing; switching (via memory, bus, or crossbar interconnection network); output processing; queueing; head-of-line blocking
- IP (§4.4): know IPv4 datagram format; fragmentation; IPv4 addressing concepts (interfaces, subnets, classful addressing, CIDR); DHCP; NATs and NAT traversal; ICMP (§5.6, 7th ed.); IPv6; dual-stack vs. tunneling approaches for IPv4-to-IPv6 transition
- Routing algorithms (§4.5 or §5.1): know (basic) graph theory; link state and distance vector algorithms and their properties; poisoned reverse; hierarchical routing; ASs and gateways
- Internet routing (§4.6 or §§5.2–5.4): know routing tables; intra-AS routing (IS-IS, RIP, OSPF) (including RIP advertisements, OSPF backbones/areas); inter-AS routing (BGP) (including eBGP, iBGP, AS-PATH and NEXT-HOP properties); stub, multihomed stub, and provider ASs
- Broadcast, multicast routing (§4.7, 6th ed.): know the distinction among unicast, broadcast, multicast, and anycast; flooding and broadcast storms; RP; (minimum) spanning trees (MSTs) and MST construction algorithms; multicast groups; multicast routing via center-based, source-based trees

Chap. 5 or 6: Link Layer (cont’d)
- MAC links and protocols (§5.3 or §6.3): Know point-to-point vs. broadcast links; MAC protocols (channel partitioning–TDMA/FDMA/CDMA; random access–slotted and “regular” ALOHA, CSMA/CD, binary exponential backoff; taking turns–polling and token-passing)
- MAC addresses and ARP (§5.4.1 or §6.4.1)
- Ethernet (§5.4.2 or §6.4.2) and VLANs (§5.4.4 or §6.4.4)
- Know the distinctions between routers, switches, and hubs as well as filtering, forwarding, and switch learning (§5.4.3 or §6.4.3 of [CNTDA]) and the pros/cons of switches and routers.
- Know THE BASICS of:
  - PPP (see [CNTDA] website, Part 6 of [CNPPP]);
  - ATM (see [CNTDA] website, Chaps. 6, 7 of [I], Sect. 3.8 of [ICN]);
  - X.25 (see [CNTDA] website, Chaps. 6, 7 of [I]);
  - Frame Relay (see [CNTDA] website, http://docwiki.cisco.com/wiki/Frame_Relay);
- and distinctions among these and other link-layer protocols.
  - MPLS (§5.5 or §6.5, [CNTDA])
  - Datacenter networking (§5.6 or §6.6, [CNTDA])

Chap. 6: Wireless & Mobile Networks (6th ed.); Chap. 7 (7th ed.)
- Introduction to wireless (§6.1 or §7.1): Know wireless hosts, wireless communication links, wireless APs and cell towers, infrastructure and ad-hoc modes, handoff
  - Wireless links & networks (§6.2 or §7.2): Know path loss, interference, multipath propagation, SNR and BER, hidden terminal problem
  - 802.11 wireless LANs (§6.3 or §7.3): Know 802.11 architectures: BSSs, SSIDs, association & authentication, WiFi channels and frequencies (2.4 and 5 GHz); beacons vs. probe request/response; CSMA/CA; RTS/CTS; 802.11 frames and MAC addresses; Bluetooth