This summary does not cover all materials discussed in this course but gives a guide for study. The midterm test will be based on Chapters 1-5 of the textbook. The materials of the textbook were not uniformly discussed; some parts were discussed in details with extra contents/examples and other parts were not. Please refer to the course notes posted at CourseCentral and the notes taken at class for details. I expect your comprehensive understanding of the materials listed in the summary.

- **Chapter 1 Introduction**
  Components in internet, internet services, protocols, network classification, circuit switching, packet switching, Internet structure, performance of networks (delay, throughput, error rate), delay in packet switched network, queuing delay, bottleneck link, layered structure of protocols, layers in TCP/IP and OSI.

- **Chapter 2 Application Layer**
  Application program models, client-server model, P2P model, application program interface (API), service required by application, service from transport layer (TCP and UDP), Web and HTTP, non-persistent and persistent HTTP, response time for non-persistent and persistent HTTP, Web cache, E-mails (SMTP), DNS, domain name for hosts, file delivery times in client-server model and P2P model, content distribution networks.

- **Chapter 3 Transport Layer**
  Transport layer service, transport layer protocols, multiplexing, UDP, reliable data transfer (ACK and retransmission), stop and wait, pipelined reliable transfer, go-back-N, selective repeat, sliding window, TCP, TCP/UDP port, TCP segment, TCP sliding window, TCP reliable data transfer, retransmission timer, TCP flow control, TCP connection establishment and termination.

- **Chapters 4 and 5 Network Layer**
  Property of service, virtual circuit networks and datagram networks, key network layer functions (forwarding at data plane and routing at control plane), destination base datagram forwarding, routing table, table look up (longest prefix matching), IP layer protocols, IPv4, IPv4 addressing, CIDR address, special IPv4 addresses, DHCP, assign network IP addresses, network address translation, IPv6, IPv6 addressing, generalized forwarding and software defined network (SDN), graph for internet, link-state routing algorithm, distance vector routing algorithm, hierarchical routing, autonomous system (AS), interior gateway protocols (RIP,OSPF), exterior gateway protocol (BGP).