Data Communications and Computer Networks

# Spring 2025

**Course Description**:

These chapters cover key concepts in computer networking, including network models (TCP/IP and OSI), data transmission, network media, interface standards, multiplexing, error detection, LANs, and wireless technologies. The focus is on the components, protocols, and techniques that enable reliable, efficient communication in modern networks.

# Textbook:

Data Communications and Networking (5th Edition) by Behrouz A. Forouzan, McGraw-Hill Education

**Instructor**: Ahmad Khachan; Tel: 05395936273

Email:khachan.ahmad@gmail.com

**Course outline:**

Chapter one:

Define key computer network terms, recognize components and common examples, explain "convergence" and network architecture, and compare TCP/IP and OSI models, outlining their layers and functions.

Chapter 2:

Distinguish between data and signals, explain the advantages of digital over analog signals, and discuss key components, bandwidth, signal strength, attenuation, and encoding techniques; also cover modulation, digitization techniques, and data codes used in communication systems.

Chapter 3:

Outline the characteristics, advantages, and disadvantages of twisted pair wire, coaxial cable, fiber-optic cable, terrestrial and satellite microwave systems, cellular telephones, short-range transmissions, and wireless systems, while applying media selection criteria to specific applications.

Chapter 4:

List the four components of interface standards, explain USB and EIA-232F operations, and discuss the advantages of FireWire, Lightning, SCSI, iSCSI, InfiniBand, and Fibre Channel; also outline data link interface types and terminal-to-mainframe connection characteristics.

Chapter 5:

Describe various multiplexing techniques (frequency division, time division, statistical, wavelength division, and code division), their applications, advantages, and disadvantages; also cover compression methods (lossy vs. lossless) and operations of run-length, JPEG, and MP3 compression.

Chapter 6:

Identify common network noise types, error-prevention and error-detection techniques, and compare their efficiency; perform parity calculations, and explain the advantages of checksums, cyclic redundancy, and error control methods, including Hamming self-correcting codes.

Chapter 7:

Define local area networks (LANs), outline their functions, activities, applications, and advantages/disadvantages; identify LAN topologies, medium access control techniques, IEEE 802 frame formats, and common LAN systems.

Chapter 8:

Compare wireless LANs to wired LANs, outline the functions of network operating systems, and explore Novell NetWare's contributions; compare Windows Server, Unix, Linux, and Mac OS X Server, recognize network server types, RAID levels, utility and Internet software, software licenses, and support devices on LANs.

Chapter 9:

Distinguish between LANs, MANs, and WANs, compare MAN characteristics to LANs and WANs, and describe circuit-switched, datagram packet-switched, and virtual circuit networks; also cover connection-oriented vs. connectionless networks, centralized vs. distributed routing, static vs. adaptive routing, flooding, hop count/limit, and network congestion concepts including quality of service.

Chapter 10:

Discuss the roles of IP in network connections, identify IPv4 and IPv6 addresses, and explain TCP's responsibility in ensuring reliable, end-to-end connections; also cover the relationship between TCP/IP and protocols like ICMP, UDP, ARP, DHCP, NAT, and tunneling, and describe DNS’s role in converting URLs to IP addresses.

**Grading:**

Final Exam 40%

Midterm 30%

Assignments 20%

Quiz 10%

Your final grade will be based on the scores you have earned from your exams, homework assignments, including a possible term project.

All work in this course must be **INDIVIDUAL** effort unless otherwise specified.