Course Outline

1. Introduction to Computer Networks
   Chapter 1:
   - Telecommunications Basics
   - A Communications Model
   - Station Interconnection
   - Switched Communications Networks
   - Circuit Switching vs. Packet Switching Networks
   - Packet Switching Alternatives
   - Frame Relay Networks
   - Asynchronous Transfer Mode Networks (ATM Networks)
   - Broadcast Networks: Satellite Networks, Radio Networks, LANs
   - The Internet
   - Intranets and Extranets

2. Data Transmission Fundamentals
   Chapter 3: Review Questions: 3.1 thru 3.10;
   HW Problems: 3.1 thru 3.10, 3.15, 3.16, 3.18, 3.19, 3.21
   Appendix A, D:
   - Data, Signals, and Transmission
   - Analog vs. Digital
   - Channel Types: Simplex, Half-Duplex, Full-Duplex
   - Parallel vs. Serial Transmission
   - Asynchronous vs. Synchronous Transmission
   - Time Domain Concepts
   - Frequency Domain Representation of Signals
   - Bandwidth
   - Filters
   - Transmission Impairments: Attenuation, Delay Distortion, Noise, Echo
   - Channel Capacity

3. Data Encoding
   Chapter 5: Review Questions: 5.1 thru 5.11; HW: 5.7, 5.8, 5.9, 5.10, 5.19, 5.20
   Chapter 8: Review Questions: 8.1 thru 8.7; HW: 8.1, 8.7, 8.8, 8.9, 8.12, 8.13
   Chapter 16: (Section 16.1): Review Question: 16.1
   - Digital Data --> Digital Signals (Transceivers)
   - Digital Data --> Analog Signals (Modems)
   - Analog Data --> Digital Signals (Codecs)
   - Speech Encoding: PCM, ADPCM
   - Analog Data --> Analog Signals
   - Multiplexing: FDM & TDM
   - DSL Lines: T-1, E-1, ISDN, ADSL, xDSL
   - ISDN BRI and PRI Channels and Services

Examination #1: [exam#1 outline]
4. Protocols
   Chapter 2: Review Questions: 2.1 thru 2.11; HW Problems: 2.2, 2.5, 2.6, 2.7
   Appendix E: The OSI Model
   Appendix O: TCP/IP Example
   - Protocol Concepts & Functions
   - A Simple Protocol Architecture
   - The TCP/IP Protocol Architecture
   - Protocol Implementation
   - TCP/IP Sample Configuration
   - Traditional vs, Multimedia Internet Applications

5. Internetworking
   Chapter 22: Review Questions: All, HW:22.3, 22.4, 22.5
   Chapter 23: Review Questions: All, HW 23.2
   Chapter 27 (Section 27.1) Review Question: 27.1; HW: 27.1
   Chapter 11 (section 11.3): Review Question: 11.8
   - Principles of Internetworking
   - Approaches
   - Internet Protocols: IP, ICMP
   - IPv6, ICMPv6
   - Internet Routing: ARP, RIP, OSPF, EGP, BGP
   - Virtual Private Networks
   - IP Security (IPSec) Standards
   - Multicasting
   - Mobile IP
   - Integrated Services Architecture
   - Resource Reservation Protocol (RSVP)
   - Differentiated Services
   - Multiprotocol Label Switching

6. Transport Protocols
   Chapter 15: Review Questions: All; HW: 15.3, 15.5, 15.6, 15.7, 15.10, 15.13, 15.15, 15.16, 15.17, 15.18
   Chapter 7 (Reference Text - Section 7.3):
   Chapter 25 (Section 25.4): Review Questions: 25.6, 25.7; HW: 25.3, 25.4
   - Transport Layer Issues
   - The Transmission Control Protocol (TCP)
   - TCP Mechanisms, Policies, and Traffic Control
   - The User Datagram Protocol (UDP)
   - Real-Time Transport Protocol (RTP)
7. Application Protocols
   Chapter 3 (Reference Text): Link to Review Questions and HW
   Review Questions: 3.1 thru 3.11; HW: 3.1, 3.2
   Chapter 2 (Appendix): HW: 2.13, 2.15
   Appendix R:
   - The Client-Server Paradigm
   - Directory Services: DNS
   - Remote Login: TELNET, SSH
   - File Transfer: FTP
   - Trivial File Transfer Protocol (TFTP)
   - Electronic Mail: SMTP, MIME, POP
   - Universal Resource Locators (URLs)
   - Hypertext Transfer Protocol (HTTP)

8. Cellular Wireless Networks
   Chapter 10: Review Questions: All
   - Principles of Wireless Networks
   - Cellular Network Generations (3G, 4G, 5G)
   - LTE-Advanced

Exam #2

9. Wireless LAN Networks
   Chapters 11: Review Questions: All
   Chapters 12: Review Questions: 12.1 thru 12.4
   Chapters 13: Review Questions: All; HW 13.1
   Chapter 17 (reading only): Review Question: All
   - Legacy LAN Networks: Ethernet, ...
   - Wireless LAN Technology
   - Spread Spectrum Technology
   - IEEE 802.11 Architecture and Services
   - IEEE 802.11 MAC Layer
   - IEEE 802.11 Physical Layer
   - IEEE 802.11 Security Considerations

10. Computer and Network Security
    Chapters 26: Review Questions: All; HW: 26.1, 26.3, 26.5
    Chapters 27: Review Questions: All
    - Computer Security Concepts
    - Threats, Attacks, and Assets
    - Intruders
    - Malicious Software Overview: Viruses, Worms, Bots, etc.
    - VPNs and IPsec
    - SSL and TLS
    - WiFi Protected Access
    - Intrusion Detection
    - Firewalls
    - Malware Defense

Final Examination