

COMPUTER COMMUNICATIONS AND NETWORKS

Qualifying Exam Syllabus

Updated: August 2017

Topics:

Computer Networks and the Internet

- Description of Internet structure
- Delay, Loss, and Throughput in Packet-Switched Networks
- Protocol Layers and Their Service Models
- Layered Architecture and Encapsulation

Application Layer

- Principles of Network Applications
- Network Application Architecture
- The Web and HTTP
- Web Caching
- Electronic Mail in the Internet
- DNS—The Internet's Directory Service
- Peer-to-Peer Applications

Transport Layer

- Transport-Layer Services
- Relationship Between Transport and Network Layers
- Principles of Reliable Data Transfer
- Connection-Oriented Transport: TCP
- Connectionless Transport: UDP

The Network Layer

- Forwarding and Routing
- Network Service Models
- Virtual Circuit and Datagram Networks
- The Internet Protocol (IP): Forwarding and Addressing in the Internet
- Internet Control Message Protocol (ICMP)
- IPv6
- Routing Algorithms

The Link Layer: Links, Access Networks, and LANs

- The Services Provided by the Link Layer
- Error-Detection and -Correction Techniques
- Multiple Access Links and Protocols
- DHCP, UDP, IP, and Ethernet
- Web Client-Server Interaction: TCP and HTTP

The Physical Layer

- Basic theories: Fourier analysis, Nyquist theory, and Shannon's theory
- Transmission medium: guided medium, wireless medium
- Communication systems: satellite, telephone system (DSL), mobile phone system, cable system (cable medium)

Wireless and Mobile Networks

- Wireless Links and Network Characteristics
- CDMA
- WiFi: 802.11 Wireless LANs
- Cellular Internet Access
- Mobility Management: Principles and Addressing
- Virtualization: A Network as a Link Layer
- Wireless and Mobility: Impact on Higher-Layer Protocols