

Computer Science 4314 Computer Networking

Student Learning Outcomes

1. Students will demonstrate an understanding of network architecture, both hardware and software.
2. Students will demonstrate an understanding of various networking protocols, the TCP/IP protocol stack in particular.
3. Students will demonstrate an understanding of client-server applications.
4. Students will demonstrate an understanding of the difference between IPv4 and IPv6 network protocols.
5. Students will demonstrate an understanding of one or more routing algorithms.

Course Content

Textbook: Computer Networking: A Top-Down Approach, Sixth Edition, by Jim Kurose and Keith Ross. The following chapters are covered (See textbook "Contents").

1. **Computer Networks and the Internet.** History and current architecture of the Internet, the network Edge, the network Core, delay, loss and throughput in Packet-Switched networks, Protocol layers and Service models, Client-server model, messages, segments, datagrams, frames.
2. **Application Layer.** Principles of Network applications, methods of process communication, transport services available to applications, application-layer protocols, World-Wide Web, HTTP, non-persistent and persistent connections, cookies, web caching, FTP, SMTP and email, DNS services, peer-to-peer applications.
3. **Transport Layer.** Transport layer services, relationship between transport and network layers, multiplexing and demultiplexing, Connectionless vs. connection-oriented services, UDP, principles of reliable data transfer, TCP, error control, flow control, congestion control.
4. **Network Layer.** Forwarding and routing, network service models, virtual-circuit networks, datagram networks, routers, switching, IP protocol, IPv4, IPv6, ICMP protocol, routing algorithms, routing in the Internet, broadcast and multicast routing.
5. **Link Layer and Local Area Networks.** Link layer implementation, error detection and correction, multiple access protocols, link-layer addressing, Ethernet, link-layer switches.