

Introduction to Computer Networking (EC 441)

List of Topics

This course is an introduction to the foundations and design of computer networks, at an advanced undergraduate-level. We expect to cover the following topics:

Networking Foundations: Network elements and architectures, packet and circuit switching, performance measures (delay, throughput), OSI and TCP/IP protocol suites, layering.

Applications: World Wide Web (HTTP), the domain name system (DNS), E-mail (SMTP), Internet socket programming.

Transport Protocols and Reliable Data Transfer: Connectionless transport: UDP, Connection-oriented transport: reliable transfer, sliding window protocols (Stop & Wait, Go-Back-N, Selective Repeat), TCP, congestion control, time-out computation.

Internetworking: Internet protocol (IP), IP addressing, subnetting, forwarding, routing algorithms (Dijkstra, Bellman-Ford), distance-vector routing, link-state routing.

Link Layer, LANs, and MAC Protocols: Framing, error detection and correction, multiple access protocols, Aloha, CSMA, Ethernet (IEEE 802.3), Ethernet switches, address resolution protocol (ARP).

Advanced Topics: Software-defined networking, network security, peer-to-peer networks, wireless LANs (IEEE 802.11).

Networking Tools: Wireshark, Python sockets, ns-2, Mininet, OpenFlow, ping, traceroute, nslookup, ifconfig, iPerf.

