CSE232 - Computer Networks

Credits: 4

Preconditions:

- Introduction to Programming (CSE101)
- Operating Systems (CSE231)
- Algorithms Design & Analysis (CSE222)

Post Condition (on student capability after successfully completing the course):

1. Can implement a client-server application using socket-programming.
2. Understand OSI Reference Model - can identify all the protocols used at different layers in an application like email.
3. Use network debugging tools (like packet capture, ping, traceroute, etc.) to detect problems.
4. Design a network for an organization (both single-location and multi-location ones)
5. Identify deficiencies in existing protocols, and improve them for different contexts.

Brief Description:

This course teaches the standard layers in network, circuit and packet switching, protocols at the link layer, routing algorithms, TCP/IP protocol, and new challenges in wireless networks.

Lecture Schedule:

Week	Topics Covered
Week 1	Introduction: Networks edge, Network core, Internet structure, OSI Reference Model, What is a Protocol? Circuit switching vs Packet switching, Datagram vs Virtual Circuits, etc.
Week 2	Application layer - DNS, Email (SMTP, IMAP, POP), FTP Socket Programming
Week 3	Application layer: Web (HTTP), Proxy, Peer-to-peer file sharing,
Week 4	Transport layer: Principles behind transport layer services
Week 5-6	Transport layer: UDP and TCP
Week 7-8	Network layer: Principles behind network layer services, Internet Protocol, ICMP, Introduction to IPv6
Week 9	Review of shortest path algorithms, Internet routing, Link State vs. Distance Vector, Intra-AS (RIP, OSPF) vs Inter-AS (BGP)
Week 10-11	Link layer: Ethernet, WiFi, Token Ring, MAC layers, Error detection, ARP, RARP, BOOTP, DHCP
Week 12	Physical Layer, Data encoding
Week 13	Network security, firewalls

Tutorials:

A weekly tutorial, primarily to help students clarify their doubts.

Labs: No scheduled labs but programming assignment to be done by students at the beginning of the course.

Evaluation:

- Midsem Exam: at least 25%
- Final Exam: 40%
- Quizzes (3): 15%
- Assignments: 15-20%

Text/Other resources:

The main text book for the course is:

- J.F.Kurose and K.W.Ross, Computer Networking: A Top-Down Approach, Pearson, Fifth Edition, 2012.

Other reference books are:

- A. S. Tanenbaum and D. J. Wetherall, Computer Networks, Pearson, Fifth Edition, 2014.
- L L Peterson and B S Davie, Computer Networks: A Systems Approach, Morgan Kaufmann, Fifth Edition, 2012.