

Computer Networks

1.1 Course Description

The principles and practice of computer networking, with emphasis on the Internet. The structure and components of computer networks, packet switching, layered architectures, TCP/IP, physical layer, error control, window flow control, local area networks (Ethernet, Token Ring; FDDI), network layer, congestion control, quality of service, multicast.

1.2 Learning Targets/Outcomes

- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies;
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols;
- Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure
- Have a working knowledge of datagram and internet socket programming

1.3 Course Organization

There will be 3-hours lectures per week, 1-hour tutorial/discussion session and 2-hours lab/project section each week. Please note that some of the tutorial/discussion sessions may be converted to lectures if need be. Students are expected to attend all lectures and to participate in class discussions.

2.1 Course Text Book

- A.S. Tanenbaum, Title: Computer Networks, Publishers: Pearson Education, Delhi, Fourth Edition or latest

2.2 Reference Text Books

- Behnouz A. Forouzan, “Data Communication and networking”, 2nd Ed., Tata McGraw Hills 2003
- Black U, “Computer Networks-Protocols, Standards and Interfaces”, PHI 1996
- Comer E. Douglas, “Computer Networks and Internets”, 2nd Ed., Pearson, 2000
- W. Stallings, “Data and Computer Communications”, 7th Ed., Pearson, 2002.

3. Teaching Schedule

3.1 Basic concepts

- 3.1.1 Components of data communication
- 3.1.2 Standards and organizations
- 3.1.3 Network Classification
- 3.1.4 Network Topologies

3.2 Basic concepts

- 3.2.1 Network Protocol
- 3.2.2 Layered Network Architecture
- 3.2.3 Overview of OSI reference model

3.2.4 Overview of TCP/IP protocol suite

3.3 Physical Layer

- 3.3.1 Cabling, Network Interface Card
- 3.3.2 Transmission Media Devices- Repeater
- 3.3.3 Hub, Bridge
- 3.3.4 Switch, Router, Gateway

3.4 Data Link Layer

- 3.4.1 Framing techniques
- 3.4.2 Error Control
- 3.4.3 Flow Control Protocols
- 3.4.4 Shared media protocols - CSMA/CD and CSMA/CA

3.5 Network Layer

- 3.5.1 Virtual Circuits and Datagram approach
- 3.5.2 IP addressing methods
- 3.5.3 IP addressing methods..contine
- 3.5.4 IP addressing methods...continue

3.6 Network Layer

- 3.6.1 Subnetting
- 3.6.2 Subnetting ..continue
- 3.6.3 Routing Algorithms (adaptive and non-adaptive)
- 3.7.4 Routing Algorithms (adaptive and non-adaptive)..continue

3.7 Transport Layer

- 3.7.1 Transport services
- 3.7.2 Transport Layer protocol of TCP
- 3.7.3 Transport Layer protocol of TCP..continue
- 3.7.4 Transport Layer protocol of UDP

3.8 Application Layer

- 3.8.1 Application layer protocols and services -Domain name system
- 3.8.2 HTTP,
- 3.8.3 WWW, telnet
- 3.8.4 FTP, SMTP

3.9 Network Security : Common Terms, Firewalls, Virtual Private Networks

- 3.9.1 Common Terms
- 3.9.2 Firewalls
- 3.9.3 Virtual Private Networks
- 3.9.4 Virtual Private Networks..continue

4.Plagiarism

The University intends to develop and promote original work. Taking another person's words or ideas and using them as if they were your own or Plagiarism, as it is called, is taken very seriously at the University. Plagiarism may be deliberate or accidental.

Software Lab based on Computer Networks:

Implement the concepts of Computer Networks such as:

1. Simulate Checksum Algorithm.
2. Simulate CRC Algorithm
3. Simulate Stop & Wait Protocol.
4. Simulate Go-Back-N Protocol.
5. Simulate Selective Repeat Protocol.

and so on....