

Course Outline

Computing Science Department
Faculty of Science

COMP 3270 – 3
Computer Networks (3,1,0)
Fall 2015

Instructor:
Office:

Phone/Voice Mail:
E-Mail:

Calendar Description

Students learn about computer network design principles and concepts, network architecture, Open Systems Interconnection (OSI) model, error detection and recovery, local area networks, bridges, routers and gateways, network naming and addressing, routing protocols, inter-networking, wireless networks, and Internet Protocol v6 network addressing. Students first gain knowledge about basic local area networks, and then learn about the wireless Local Area Networks, techniques to extend Local Area Networks, inter-networking and emerging network technologies.

Educational Objectives/Outcomes

Upon successful completion of the course, the student will demonstrate the ability to:

1. Understand network management concepts and terminology.
2. Familiar with common networking standard and protocol.
3. Understand data communication principles.
4. Understand computer network architecture, organization and management.
5. Familiar with Local Area Network organization, design, maintenance, administration.
6. Demonstrate intermediate skill of network programming.
7. Explain wireless networking structure.

Prerequisites

- Minimum 'C' from COMP 2130: Introduction to Computer Systems
- COMP 2230: Data Structures, Algorithm Analysis and Program Design

Texts/Materials

Required textbook:

1. Behrouz A. Forouzan, *Data Communications and Networking*, latest edition, McGraw-Hill, 2007, ISBN 0073376221.

Recommended textbooks:

2. James F. Kurose and Keith W. Ross, *Computer Networking – A Top Down Approach*, 6th edition, Addison Wesley.
3. Uyles Black, *Internet Architecture – An Introduction to IP Protocols*, Prentice Hall
4. Jeffrey S. Beasley, *Networking*, Prentice Hall
5. C.Huitema, *IPv6 The New Internet Protocol*, latest edition, Prentice-Hall.
6. Comer, *Computer Networks and the Internet*, 5th Edition, Prentice-Hall.
7. L. Peterson and B. Davie, *Computer Networks: A Systems Approach*, Second Edition, Morgan-Kauffman Publishers.

Overview of Course Topics

Topic	Specific objectives	Week	Book Chapter/ Sections
Fundamental Concepts	Motivation, Network Topologies, and the Internet Structure, Switching, addressing, performance issues	1	1, 2
TCP/IP	Layering and protocols, ISO/OSI model, TCP/IP and other network architectures, Interconnection components (Repeaters, Bridges, Routers, Switches, Gateways, Hubs), detailed examination of TCP/IP functions, encapsulation, addressing, demultiplexing, other network architectures.	2	3.1, 3.2, 3.3, 4.1, 5, 6.1, 7, 8
LAN Technologies (Direct Link Networks)	Multiple Access Protocols, Basic LANs, switching and forwarding, LAN switches, Ethernet, Fast Ethernet and Gigabit Ethernet.	2	9, 10.2, 10.4, 10.5, 11.2, 11.4, 12, 13, 14.4, 17.1
Internetworking	Networks with routers, routing algorithms – distance vector, link state, routing protocols - RIP, OSPF, BGP, IP addressing, subnetting and supernetting, variable length subnet masking.	3	18, 19.1, 20, 23.1, 23.2
IPv6 Networks	Basis for the new protocol; IPv6 components; Transitioning from IPv4 to IPv6.	2	22, 25.1, 25.2
Wireless Networks	Underlying theory for high-speed switching using all-optical networks; optical network topologies and components; switching.	2	15, 16.1, 16.2

Note:

- 1) Book chapters and sections are all taken from the required textbook and represents a broad outline of the topics.
- 2) The above listing is a broad outline of the topics intended to be covered in the course. As the course progresses, each module will be outlined in detail.

Seminar/Lab:

Sl#	Topic	Week
1.	Experiments with packet sniffer and some basic networking tools such as Traceroute, Ping, Wiresharks, etc.	1 & 2 & 3
2.	Programming assignments to demonstrate the Basic Data Encoding Scheme (NRZ, Manchester, Millar code, etc.)	4
3.	Programming assignments to demonstrate the operations of Bridge Learning	5
4.	Programming assignments to demonstrate the error correction and detections (parity check, CRC, etc. implementations).	6
5.	Set up a simple network and experiment with static and dynamic routing in the network. Exercise on IPv4 addressing.	7 & 8
6.	Implementation of simple network applications using socket programming and UDP programming.	9
7.	Examining different packet format and their field value of a wireless network (WiFi) using NetStumbler or similar standard wireless packet sniffer.	10

ACM / IEEE Course Outline Format

Knowledge Areas that contain topics and learning outcomes covered in the course

Knowledge Area	Total Hours of Coverage
Networking and Communication (NC)	39

Body of Knowledge coverage

KA	Knowledge Unit	Topics Covered	Hours
NC	Introduction	Introduce the concepts of computer networks and terminologies	3

NC	Network Applications	Introduction to application layer including socket programming and application development excersize	7
NC	Routing and Forwarding	Discussion of defferent routing stretegies and algorithims with simulations	7
NC	Local Area Network	Connectivity, technologies and protocols used in LAN including switchs, bridges, repeaters and hubs	9
NC	Resource Allocation	Congestion control, reliable data transfer techniques, error detection and correction techniques	9
NC	Mobility	Wireless and mobile networks (e.g., 802.11).	4