Computer Networks

Code EE-353	Credit Hours 3+1

Course Description

The area of computer networking is undergoing rapid development; it's important to focus not only on what computer networks are today, but also on *why* and *how* they are designed as they are. The aim of this course is to provide a conceptual introduction to the fundamentals of computer networks and the design principles. The lab component of this course is aimed at providing the students with an understanding of practical aspects of networking through hands-on labs. In this course, we will also study the fundamentals of building *scalable* computer networks. We will go through the thought-process that went into designing the Internet---which is the best example of a computer network that has adapted and scaled to the changing user demands.

Text Book:

1. "Computer Networking, A Top-Down Approach" (8th edition) by Kurose and Ross [K&R]

Reference Book:

1. "Computer Networks" (5th Edition) by Andrew S. Tenanbaum and David Wetherall [T&W]
2. " TCP/IP Protocol Suite" (4th Edition) by Behrouz A. Forouzan [BF]

Prerequisites

None

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignments	10%
Mid Terms	30%
ESE	45%

ASSESSMENT SYSTEM FOR LAB

Lab Work and Report	70%
Project	30%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction (Chapter 1)	Course Overview, Motivation & Introduction, what is Internet, hosts, end systems

2-6	Chapter 1&6	Communication links, packets, packet switch, route, path, protocol, network access, edge network, Physical media, network core, packet and circuit switching, queueing delays, delay, loss, throughput, Transmission delay, propagation delay, packet loss, network of networks, throughput, layering and services, Link layer overview, channel types, relationship between IP and link, services, error detection and correction scheme, MAC protocols (channel partitioning), MAC protocols (random access, taking turns), DOCSIS
7-8	Chapter 6	Switched Local Area Networks, Link layer addressing, ARP, sending a datagram off the subnet, filtering and forwarding, Ethernet, VLANs
9	**MID TERM EXAM**	
10-12	Chapter 4 & 5	Network layer, forwarding and routing, SDN approach, IPv4 addressing, IPv4 addressing, DHCP, NAT, IPv6, tunneling and encapsulation, SDN control layer, Routing Protocols, LS, DV, BGP
13-17	Chapter 2 & 3	IP anycast, BGP policy, DNS, Trasport layer, services, multiplexing/demultiplexing, socket address, port numbers, reliable data transfer, Reliable data transfer, rdt 1.0, 2.0, 2.1, 2.2, 3.0, go-back-n, selective repeat, Application programming, HTTP, SMTP

	18	**End Semester Exams**	

Practical:

Experiment No	Description
1	Intro to Wireshark and Networking
2	Network Programming
3	Creating basic network in packet tracer
4	Intro to NS-2/3
5	Ethernet & Wired media and Wireless
6	MAC Protocols
7	ARP
8	Switched networks and LAN
9	VLAN
10	Router configuration, IP
11	Routing protocols in NS-2/3
12	SDN
13	UDP&TCP
14	HTTP&DNS
15	Open Ended Lab
16	Project demos