CS3773 - Computer Networks

Course Title:	Computer Networks (CS-3773)
Pre-requisite(s):	None
Credit Hours:	3
Instructor(s):	
Text Book(s):	• Computer Networking- A Top Down approach, Author: Kurose and Ross, [8th Edition]
Reference Book(s):	• Data Communications and Networking, Author: Behrouz Forouzan, [6th Edition]
Web Reference:	

Course Introduction:

This course is an introductory course on computer networks. Using the Internet as a vehicle, this course introduces the underlying concepts and principles of modern computer networks with emphasis on protocols, architectures, and implementation issues. The main goal of this course is to understand layering in computer networks, understand different protocol stacks (OSI and TCP/IP), understand functions and protocols within a layer, understand how layers fit together and finally understand how the Internet works.

Course Objectives:

This course is a fundamental course of networking domain and after this course, students would be capable to take advance course of this domain as well as professional courses such as CCNA and CCNP etc. Another objective is to give an overview of layered architecture, layered based networking models such as TCP/IP and OSI. To develop familiarity with common networking protocols such as IP, TCP, UDP, DNS, DHCP, Ethernet, IEEE 802.11 etc. One of the goal of this

course to make student familiar with common networking tools, commands and software through which they can get practical exposure.

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Course Learning Outcomes (CLOs):

At the end of this course, the students should be able to:

CLO1: Describe the fundamental concepts of communications and Computer Networks. (Level C1)

CLO2: Analyze features, services and operations of various protocols of TCP/IP network stack. (Level C4)

CLO3: Analyze networking problems and propose a solution by applying related techniques. (Level C4)

CLOs – PLOs Mapping:

	CLO:1	CLO:2	CLO:3
PLO:1 (Academic Education)			
PLO:2 (Knowledge for Solving Computing Problems)	√		
PLO:3 (Problem Analysis)		√	√
PLO:4 (Design/ Development of Solutions)			
PLO:5 (Modern Tool Usage)			

Course Contents:

Week	Contents
1	Course Introduction and Outline - Computer Networks and the Internet; Protocols; Network Edge; Access Networks

2	The Network Edge and Physical Media; The Network Core, Packet Switching, Circuit Switching, A Network of Networks; Delay, Loss, and Throughput in Packet-Switched Networks; Queuing Delay and Packet Loss; End-to-End Delay; Throughput in Computer Networks

3	Protocol Layers and Their Service Models; Layered Architecture; Encapsulation; - Networks Under Attack; - History of Computer Networking and the Internet; The Development of Packet Switching
4	Application Layer - Principles of Network Applications; Network Application Architectures; Processes Communicating; Transport Services Available to Applications; Transport Services Provided by the Internet; Application-Layer Protocols; Web and HTTP, Cookies, Web Caches (proxy server)
5	Electronic Mail, SMTP, POP3, IMAP, Domain Name Service (DNS)
6	P2P Applications, Socket Programming with TCP, Socket Programming with UDP
7	Transport-layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, UDP header, Principles of Reliable Data Transfer
8	Connection-oriented Transport: TCP, Segment Structure, Reliable Data Transfer, TCP Flow Control, Connection Management
Mid-Term Exam	
9	Principles of Congestion Control, TCP Congestion Control; Virtual Circuit and Datagram Networks, What's inside a Router
10	IP: Internet Protocol, Datagram Format; IPv4 Addressing
11	Subnetting, Network Address Translation (NAT)
12	IPv6, Software Defined Networking (SDN)
13	Routing Algorithms; Link State and Distance Vector Routing
14	Intra-AS Routing: RIP OSPF; Routing in the Internet: BGP
15	SDN Control Plane; ICMP Internet Control Message Protocol, Network Management and SNMP
16	Link and Physical Layer Introduction and Services, Multiple Access Protocols, Link-layer Addressing, Ethernet, Link Virtualization

Grading Policy:

S.No	Grading	% of Total Marks
1	Assignments	22
2	Quizzes and Class Tests	18
3	Mid-term Exam	20
4	Final Exam	40
	Total	**100**