Title of Course: Computer Networks

Code and Credit Structure: IT 304 3-0-3-4.5

Course Placement: UG ICT and CS Group Core

Course level: Under graduate

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Aims and Objectives:

Today’s Internet can be considered as the largest engineered system, with hundreds of millions of computers connected through various communication links and devices such as switches and routers. Examples include Google’s network infrastructure, the data centers and how they are all connected. Internet as a system is being utilized by billions of users through their portable devices which include laptops, tablets, and smartphones. The inner workings of such a large system with many diverse components and uses needs to be understood. This includes the guiding principles and structure that can provide a foundation for understanding such an amazingly large and complex system.

This course will cover the fundamental principles of wired computer networks with focus on layered architecture, protocols, implementation and issues specific to the Internet. The objective is to provide an understanding of how the Internet works which include how data flows from a source to a destination. How routers route data from one point to another? How does the Internet accommodate multiple users using different applications? And lastly, we will learn to create a network of computers that emulate the behavior of the Internet.

Course Outline:


Application layer: Principles of network applications, HTTP protocol, DNS service and its architecture. Electronic email, message format, Dynamic Host Configuration protocol (DHCP).

Transport layer: Services provided to Application layer. Reliable data transfer principles, Multiplexing and Demultiplexing, TCP protocol, sliding window algorithms, pipelining
algorithms, TCP segment structure, flow control, congestion control. TCP Fairness. Socket programming.

*Network layer:* Forwarding and routing, services provided to the Transport layer, Router design, components of a router, IPv4 packet structure, protocol and addressing, Routing algorithms, Autonomous systems, Routing in the Internet: Intra (routing information protocol (RIP), Open shortest path first (OSPF)) versus Inter AS routing (Border Gateway protocol (BGP)). Network Address Translation (NAT).

*Data-link layer:* Link layer Services to Network layer, Error detection and correction, Link layer devices: Hubs, Bridges, Switches. Medium access control protocols: ALOHA, CSMA, CSMA-CA, Classical Ethernet (LAN), Switched Ethernet, Virtual LANs, Spanning tree problem.

**References:**


**Grading Policy (Tentative)**

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