

Course Title: Data Communication and Networks

Course Code: ETEG 303

Credit Hours: 3

Course Description:

This course intend to develop a broad understanding of data communications and networking

Course Contents:

Unit 1: Introduction to Data Communication and Networks

Overview of data communication and data communication networks, Transmission Media-Guided and unguided; Standards Organizations- International Standard Organization (ISO), Institute of Electrical and Electronics Engineers (IEEE), American National Standard Institute (ANSI), Electronic Industries Association (EIA); Forums and Regulatory agencies

Unit 2: Data Transmission and Multiplexing

Parallel and serial communication, Asynchronous, Synchronous and Isochronous Real Time (IRT) communication; Simplex, Half duplex and full duplex communication; Line coding; Network coding, Bandwidth utilization and multiplexing, Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Statistical time-division multiplexing (STDM), Wavelength Division Multiplexing (WDM)

Unit 3: Network Topologies, Switching and Routing

Network topologies- Introduction, Types, Characteristics and application; Switching- Introduction, Types, Characteristics and application; Routing- distance vector routing and link state routing; Routing approaches- Static, default and dynamic; Multicast routing; Difference between switch and router.

Unit 4: Network Protocols and OSI Model

Overview of data communication protocols, Principle of protocol layering, logical connection between peer layers, Layered architecture, TCP/IP protocol, Encapsulation, decapsulation and addressing; Hypertext Transfer Protocol (HTTP) and Hypertext Transfer Protocol Secure (HTTPS); Overview of next generation IP (IPv6); Open standards interconnection (OSI) Model, OSI layer functions, Data exchange using OSI layer.

Unit 5: Data Link Layer, Protocol and Control

Introduction of nodes and links, Address resolution protocol, Link layer addressing, Link layer protocol, Point to point protocol (PPP), High level data link control (HDLC), Transmission error, Error detection and correction techniques; Data link control services; Media Access Control (MAC)- Random access, controlled access.

Unit 6: Network Layer Services, Protocol and Control

Network layer Services- Packetizing, Routing and Forwarding; Packet Switching- Datagram and virtual circuit approach; Performance- Delay, Throughput, Packet loss and congestion control; IPV4 addresses, Forwarding of IP packet.

Unit 7: Wired and Wireless Networks

Local Area Networks (LAN), Virtual LAN, Metropolitan Area Networks (MAN) and Wide Area Networks (WAN), Personal Area Network (PAN), Body Area Network (BAN) ; Wireless- LAN, MAN, WAN, PAN, BAN ; Ethernet, Fast and gigabit Ethernet, Fiber Distributed Data Interface (FDDI), Switched Multimegabit Data Services (SMDS), IEEE 802.11 a/b/g/n/ac/ax.

Unit 8: Network Management and Security

Network Management- Configuration; Fault management- Attack, Key ciphers and authentication; Network security; Internet security- Security protocols, Virtual Private Network (VPN), Email security, Firewall

Unit 9: Network Analysis

Overview of simulation tools used for network analysis, Overview of Client Server programming, Network analysis using simulation tool.

References:

1. W. Stallings, *Data and Computer Communications*, Prentice Hall
2. John Freer, *Computer Communications and Networks*, Affiliated East-West Press Pvt. Ltd.

Evaluation:

In-Semester Evaluation: 50%

End-Semester Evaluation: 50%