

MODULE: Networks & Data Communications

Semester	I (Fall)	
Stage	III	
Number of Credits:	4 semester credits/6 quarter units	
Theme	Hardware & Software Platforms	
Assessment Weightings	Continuous Assessment	30%
	Examination	70%

Aims

This module aims to introduce the different types of signals used for conveying data and show how data may be encoded for transmission. The module will introduce the student to network terminology and cover some common network standards and protocols used.

Learning Outcomes

On completion of this module students will be able to:

- Differentiate between different types of network.
- Explain the terminology associated with network components.
- List and identify the elements of the OSI reference model.
- Explain how the TCP/IP model is implemented.
- Discuss the concepts behind encryption and decryption.

Indicative Content

Topic	Description
Introduction to Data Communications	Analogue and digital signals. Transmission impairments: Attenuation, delay & noise. Asynchronous & synchronous transmission. Simplex, half / full duplex line configuration. Frequency & Time Multiplexing, broadband & baseband.
Data Encoding Overview	Digital signal techniques: Manchester, NRZ & Bipolar. Analogue techniques: Amplitude, phase & frequency shift keying. Pulse code modulation & quantisation.
Introduction to Networks	Network definition - goals and applications. Classification of Networks - LAN/MAN/WAN/SAN. Network components: Servers, workstations, cabling, network interface cards.
OSI Model	OSI seven layer reference model: physical layer, data link

	layer, network layer, transport layer, session layer, presentation layer, application layer.
Topologies & Network Media	Network topologies: star, ring, bus & mesh. Network media selection criteria. Cable/Wireless Media: Coaxial, Twisted Pair, fibre optic, wireless: spread spectrum, microwave and infra red.
Local Area Networking	Data Link Layer services, framing, error & flow control. Media Access Control: CSMA/CD & Token Ring. 802 Standards: 802.2, 802.3/u/z, 802.5. Devices: Hubs, repeaters, bridges and switches.
Internetworking & TCP/IP	Network Layer services, data flow, connection establishment / termination, flow control. Congestion & Static/Dynamic Routing. TCP/IP Model. IP header, addressing & subnetting. Internet Control Protocols: ARP, RARP & ICMP.
End to End Delivery	Transport Layers requirements: addressing, reliability and flow control. TCP / UDP protocols.
Network Security	Encryption/Decryption methods, DES, RSA. Message authentication, message digests and digital signatures Access control firewalls: packet filters and application gateways Security examples: IPSec and SSL
Applications	Email: SMTP & POP3 FTP, TELNET & HTTP

Teaching and Learning Methods

This Module will be taught using lectures, demonstrations, tutorials and practical work using MS Windows network operating system. A number of graded assignments / in class tests will also be given as part of the course.

Assessment Methods

Assessment will use both a continuous component and an end of semester examination. The continuous assessment component is used to develop practical skills. Students will install and operating system and configure it for network use. They will then configure a peer-to-peer LAN and client server architecture.

Primary Reading List

Title	Author	Publisher
Computer Networks 4 th Edition	Andrew Tanenbaum	Prentice-Hall

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Recommended Reading List

Data & Computer Communications 6 th Edition	William Stallings	Prentice Hall
Data Communications & Networking 2 nd Edition	Behouz A. Forouzan	McGraw Hill