MODULE: NETWORKS AND DATA COMMUNICATIONS (course code BSCH-NDC)

Griffith College Dublin – Computing Science

Fall semester

This module is intended for junior and senior level students who are majoring in this field.

Aims

This module provides you with an understanding and appreciation of the concepts involved in communications techniques and provides you with an in-depth understanding of computer networking. It also provides you with an understanding of different networking standards. The module will cover some of the protocols commonly found in modern networks and how their operation relates to the OSI and TCP/IP model.

Learning Outcomes

Upon successful completion of this module, you should be able to:

1. compare and contrast digital and analogue signalling
2. explain how data may be modulated using different modulation techniques
3. discuss the synchronisation methods of data transmission
4. evaluate and select appropriate network topologies and communication's media
5. identify and explain the operation of network devices
6. describe the main communications principles
7. explain the operation of network hardware and network protocols and how they relate to the OSI and TCP/IP models
8. install and configure a Local Area Network and successfully administer said LAN.

Indicative Content

Topic	Description
Introduction to Networks and Communications	Communications model. Network definition: Goals and applications; Classification of Networks: WAN's & LAN's Circuit & Packet switching techniques.
Network Standard Models	Standards Organisations. ISO/OSI Reference Model. Overview of services and function of each layer; TCP/IP model overview;
Data	Terminology & periodic signals.

Transmission	Frequency Domain concepts. Signal strength: power& Decibels. Analogue & digital signals. Transmission impairments. Modulation techniques.
Data Communications Interface	Synchronous vs. Asynchronous Simplex / Half Duplex / Full Duplex
Transmission Media	Guided: Twisted pair, coaxial, fibre optic Unguided: Wireless, Infrared
Local Area Networks	Network topologies. Media access control: TDM, Polling, Token passing & CSMA/CD. LAN devices- Repeaters, Hubs, Bridges & Switches. LAN protocols: IEEE 802 series: 802.3 and 802.5; Types of servers: File, print, database, web servers; Network models: Peer to Peer and Client/Server models;
Introduction to Internetwork Protocols	Data Link Layer: Framing, MAC addressing, error and flow control; Basic IP addressing and basic IP fragmentation. Routing concepts: Static & dynamic Transport protocols: TCP & UDP
Wireless Networks and Security	Basic wireless propagation; antennas, modulation, cellular and other wireless networks. Access; Measurements; Security and Privacy
Practical Case Studies	Practical hands on the job installation and configuration a one or more class of a LAN.

Assessment Methods
Continuous assessment will be based on a combination of the following:

- Literature Survey report.
- A Programming assignment.
- A weekly homework as a Tutorial.
- A class test.
- Oral Quizzes.

The continuous assessment component will examine all learning outcomes. The final examination will examine learning outcomes 1 – 7.