**CS 4290: DATA COMMUNICATION AND NETWORKS**

**Semester Hours:** 3.0  
**Contact Hours:** 3  

**Coordinator:** Sankardas Roy  

**Text:** Data and Computer Communication  

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**Year:** 2013  

**SPECIFIC COURSE INFORMATION**

*Catalog Description:*
Data communication concepts; network topologies; transmission media; network access control; communication protocols; network architecture; LANs, MANs, and WANs; internetworking.  
Prerequisite: CS 3270

**Course type:** ELECTIVE  

**SPECIFIC COURSE GOALS**

- I can define and describe network architecture (layered approach and hierarchical approach).  
- I can describe wireless communications.  
- I can describe analog and digital signals and their role in data transmission  
- I can describe transmission impairments (distortion and noise limitations on system performance).  
- I can describe the multiplexing of signals for data transmission.  
- I can describe contention protocols.  
- I can describe data compression and related techniques.  
- I can describe data integrity and related techniques.  
- I can describe data security and related techniques.  
- I can describe the features of flow control and related techniques.

**LIST OF TOPICS COVERED**

- Data Communication Concepts
• Networks and open system standards: the OSI reference model
• Network topologies and the physical layer
  ▪ Bus/Tree topology, ring topology, star topology
• The future of data communications

• Transmission Media and Transmission Technologies
  o The electrical interface
  o Metallic media
  o Optical fiber media
  o Wireless media (line-of-sight media)
  o Baseband and broadband transmission
  o Transmission bandwidth (link capacity)
  o Codes
  o Analog and digital signals
  o Modulation and demodulation, modems and modem standards
  o Transmission impairments (distortion and noise limitations on system performance)

• Data Transmission
  o Transmission modes
    ▪ Simplex, half-duplex, full-duplex communications
    ▪ Serial and parallel transmission
    ▪ Synchronous transmission
    ▪ Asynchronous transmission
  o Interface standards
  o Multiplexing of signals
  o Data compression

• Protocol Concepts - Media Access Control
  o Protocol basics
  o MAC protocols (CSMA/CD and Token passing)

• Data Security and Integrity
  o Error detection and correction
  o Encryption and decryption
  o Viruses, worms, and hacking
• Local Area Networks
  o LAN standards (IEEE standards 802 for LANs)
  o Interconnecting LANs
  o LAN Hardware (server platforms, backup devices, LAN adapters, printers, etc.)
  o LAN system software, LAN application software
  o LAN selection criteria
• Metropolitan Area Networks (MANs) and Wide Area Networks (WANs)
  o Network routing
  o Public data networks
  o Circuit-switched data network
  o Packet-switched data network
  o Internet protocol
  o ISDN
  o Electronic mail
• Network Architecture
  o Layered approach
  o Hierarchical approach
• Network Interconnections (Internetworking)
  o LAN-to-LAN connections and LAN-to-Host connections
  o Repeaters, Bridges, Routers, and Gateways
  o Interconnection utilities