

1. Course Number and Course Title:

COE 370 – Communications Networks

2. Credit Hours:

3 – 0 – 3

3. Prerequisites and/or Co-Requisites:

Prerequisite: COE 221 (Digital Systems) and MTH 104 (Calculus II)

4. Name and Contact Information of Instructor:

Name: Dr. Rana E. Ahmed

5. Course Description (Catalog Description):

Examines the principles of circuit and Packet communications networks. Includes the following topics: OSI and Internet reference models, time-domain and frequency-domain analysis of communication signals and systems, line coding, analog and digital modulations, transmission media, error and flow control techniques and protocols, multiple access, and LAN technologies.

6. Textbook and other Supplemental Material:

Textbook:

- B. A. Forouzan, *Data Communications and Networking*, 5th Edition, McGraw-Hill, 2013

Other supplemental material:

- W. Stallings, *Data and Computer Communications*, 10th Edition, Prentice-Hall 2014.

7. Course Learning Outcomes:

Upon completion of the course, students will be able to:

1. Understand different networking topologies, layered models, multiplexing, and circuit and packet switching principles.
2. Characterize the spectra and bandwidths of analog and digital signals using Fourier analysis, and various transmission impairment.
3. Analyze and compare various line coding, analog and digital modulation schemes.
4. Compare characteristics of different types of media used for data communications, including UTP, STP, coaxial cables, optical fibers, and free-space channels.
5. Apply the principles of redundancy such as parity bits, checksum, and CRC to detect errors in data frames.
6. Demonstrate knowledge and understanding of data link protocols, such as Stop-and-Wait, and Sliding Window protocols (Go-Back-N and Selective Repeat).
7. Apply the principles of multiple access techniques to describe the operation and design issues in IEEE802.3 LAN systems.
8. Apply the principles of IP addressing to various subnetworking scenarios.

8. Teaching and Learning Methodologies:

Methods include lectures, problem-based learning, and class discussions. Students learning is assessed via in-class quizzes, exams, and homework.

9. Course Topics and Schedule:

Topic/Activity	Weeks
Introduction to computer networks; topologies; OSI, TCP/IP models	Week 1
Fourier Analysis	Week 2
Channel Impairments; Use of dBs and dBms	Week 3
Digital Line Encoding Schemes	Week 4
Analog-to-Digital Conversion ; Serial Communication	Week 5
Digital and Analog Modulation Schemes	Week 6
Multiplexing : FDM ; TDM ; Midterm I	Week 7
Circuit Switching and Packet Switching	Week 8
Transmission Media: Twisted Pair cable; Coaxial cable; Optical Fiber	Week 9
Wireless Medium; Antennas; Free Space Path Loss	Week 10
Error Control Schemes: Parity; Block Codes; CRC; Checksum	Week 11
Flow Control Schemes: Stop-and-Wait; Go-Back-N; Selective Repeat; Midterm II	Week 12
Multiple Access Schemes: ALOHA; CSMA; CSMA/CD; CDMA	Week 13
IEEE 802.3 LAN; Switched Ethernet	Week 14
IP addressing; Subnetting	Week 15
Final Exam	Week 16