1. **Course number and name**
   COE 370 – Communications Networks

2. **Credits and contact hours**
   3 credit hours, 3 contact hours

3. **Instructor's or course coordinator's name**
   Dr. Rana E. Ahmed

4. **Textbook, title, author, and year**
   B. A. Forouzan, *Data Communications and Networking*, 5th edition, McGraw-Hill, 2013.

   Other supplemental materials
   W. Stallings, *Data and Computer Communications*, 7th edition, Prentice-Hall, 2004.

5. **Specific course information**
   a. **Brief description of content of the course (catalog description)**
      Examines the principles of communications networks. Includes the following topics: OSI and TCP/IP reference models, line coding, analog and digital modulation, transmission media, multiplexing, circuit and packet switching, routing and addressing, error and flow control, multiple access, and LAN technologies.

   b. **Prerequisites or co-requisites**
      Prerequisites: COE 221/CMP 210 (Digital Systems) and MTH 104 (Calculus II)

   c. **Indicate whether a required, elective, or selected elective course in the program**
      Required

6. **Specific goals for the course**
   a. **Specific outcomes of instruction**
      This course requires the student to demonstrate the following:
      1. Describe different networking topologies, types, and network layered models
      2. Characterize the spectra and bandwidths of analog and digital signals using Fourier analysis
      3. Describe different transmission impairment, including attenuation, distortion, and noise
      4. Calculate signal powers, gains, and losses using decibel units
      5. Display the timing diagrams for different line coding schemes such as RZ, NRZ, Manchester, and AMI
      6. Calculate the bit rate for analog-to-digital conversion process
      7. Describe the digital modulation (ASK, FSK, PSK, QAM) and analog modulation (AM, FM, PM)
      8. Understand analog and digital multiplexing principles
      9. Compare characteristics of different types of media used for data communications, including UTP, STP, coaxial cables

10. Understand the underlying principles behind signal propagation in optical fibers, and free-space channels, and calculate link budgets
11. Understand circuit and packet switching and describe the principles of telephony and modem-based data communications
12. Apply the principles of redundancy such as parity bits, checksum, and CRC to detect errors in data frames
13. Describe the functions and formats of data link protocols, such as Stop-and-Wait, and Sliding Window protocols (Go-Back-N and Selective Repeat)
14. Understand the principles of multiple access techniques and apply them to describe the operation and design issues in IEEE802.3 LAN systems
15. Apply the principles of IP addressing to various subnetworking scenarios.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

This course contributes in a significant way to the accomplishment of the following program outcomes:

Program outcome	Emphasis in this course
(a) an ability to apply knowledge of mathematics, science, and engineering	◑
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	○
(d) an ability to function on multidisciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	◑
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	◑
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	○

Emphasis: ● High; ◑ Medium; ○ Low; Blank – Nothing Specific Expected

7. Brief list of topics to be covered

i. Networks and layered models
ii. Communications signals, transmission media, and digital and analog transmissions
iii. Multiplexing
iv. Network switching, routing, and addressing
v. Error and flow control
vi. Multiple Access