

## EE/CMPEN 362 – Communication Networks

**Designation:** EE elective course for electrical engineering majors.

**University Bulletin Description:** EE 362 (CMPEN 362): (3) Data transmission, encoding, link control techniques; communication network architecture, design; computer communication system architecture, protocols.

Prerequisites: CMPEN 271, EE 317 or EE 350.

### Prerequisites by Topics:

1. Understanding basic principles in calculus, differential equations, linear algebra, and complex variables.
2. Understanding of basic linear systems and the Fourier Transform.
3. Proficiency in applying elementary principles of probability.
4. Understanding of the concept of modulation in Communication.
5. Understanding of logic block diagrams

### Textbook/Required Materials:

*Computer Networks*, Andrew S. Tanenbaum, Prentice Hall, 4<sup>th</sup> Edition.

### Learning Outcomes:

The objective of the course is to ensure that students have the necessary networking skills to design, implement, and analyze communication networks. Various standards and protocols will be covered. Students will be able to design, implement, and analyze communication networks.

Upon completion of the course, students should possess the following skills:

As primary outcomes students:

- Understand the fundamentals of data communication and communication networks.
- Have the capability of designing and analyzing data transmission protocols and data link control protocols.
- Have knowledge of various network protocols including TCP/IP, and demonstrate the skills to design and evaluate network protocols.
- Be able to discuss major trends in industry and current research activities within the discipline.

As secondary outcomes students:

- Apply the principles of data communication and communication network techniques to design and evaluate new protocols.
- Skills to implement networking protocols using TCP/IP based on socket programming.
- Demonstrate independent learning and analyzing skills by using new IETF standards to solve technical problems.
- Have basic understanding of network security issues.

### Topics:

1. Communication model and protocol architecture (3 hours)
  - A. Communication model
  - B. OSI and TCP/IP protocol architecture
2. Data communication (8 hours)
  - A. Data transmission
  - B. Data encoding and modulation
  - C. Data link control

3. Wide area networks (7 hours)
  - A. Circuit and packet switching
  - B. ATM
  - C. Congestion control
4. Local area networks (10 hours)
  - A. Lan technologies
  - B. Ethernet, token ring, wireless LAN
5. Communication architecture and protocols (12 hours)
  - A. Internet protocols (IP)
  - B. Routing protocols and differentiated services
  - C. Transport protocol (TCP)

**Class/laboratory schedule:** Three 50-minute lectures per week.

**Computer usage:**

Students mostly are proficient in computer and Internet usage. They are encouraged to use the Web to gather information on developing communication ideas and standards.

**Laboratory Projects/Assignments:**

- 70% proctored assessments (exams)
- 30% unproctored assignments (homework)

**Contribution to Meeting the Requirements of Criterion 5. Curriculum:**

This course contributes to both the engineering topics and design components.

CSE 362 is an elective for electrical engineering majors who are interested in networks and network design. The course provides an understanding of communication networks and the ability to analyze and design such networks.

**Relationship to Program Outcomes:**

- O.1.1. Graduates will possess mathematics skills necessary for electrical engineering.
- O.1.3. Graduates will have attained computer proficiency.
- O.2.1. Graduates will understand how to analyze and design simple electrical/electronic circuits.
- O.2.5. Graduates will have knowledge of digital systems.
- O.3.1. Graduates will have in-depth technical knowledge in one or more areas of specialization.
- O.3.2. Graduates will have practical understanding of the major electrical engineering concepts and demonstrate application of their theoretical knowledge of the concepts.
- O.4.1. Graduates will interact with industry both within and outside of a classroom setting.
- O.6. Graduates will appreciate their role as engineers in society.

**Prepared by:** Thomas La Porta (CSE)

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