

ELN 234
COMMUNICATION SYSTEMS

COURSE DESCRIPTION:

Prerequisites: ELN 132 or ELN 140 and MAT 122

Corequisites: None

This course introduces the fundamentals of electronic communication systems. Topics include the frequency spectrum, electrical noise, modulation techniques, characteristics of transmitters and receivers, and digital communications. Upon completion, students should be able to interpret analog and digital communication circuit diagrams, analyze transmitter and receiver circuits, and use appropriate communication test equipment. Course Hours Per Week: Class, 3. Lab, 3. Semester Hours Credit, 4.

COURSE OBJECTIVES:

Upon completion of this course, the student will be able to:

- a. Define the main parts of an AM & FM communication systems.
- b. Explain the types of modulation used in electronic communication systems.
- c. Define and explain the electromagnetic spectrum and its use in radio frequency communication.
- d. List the major branches of the field of electronic communication.
- e. Calculate voltage, current, gain and attenuation in decibels as applied to communication circuits.
- f. Describe and analyze the basic types of filter circuits used in communication circuits.
- g. Calculate the modulation index and percent of modulation for FM and AM communication systems.
- h. Explain the distribution of sidebands associated with a communication signal.
- i. Define the terms Double Sideband and Single Sideband.
- j. Explain the operation of demodulator circuits.
- k. Explain low-level and high-level modulator circuits.
- l. Explain the superhetrodyne principle.
- m. Calculate the total frequency deviation of a modulated FM signal.
- n. Explain the basic principles of digital communication techniques.
- o. Explain the basic principles of transmitters.
- p. Describe the types and principles of multiplexing and demultiplexing.
- q. Describe the types and principles of binary data transmission.
- r. Explain the basic principles of local area network communication systems.
- s. Explain and describe the principles of transmission lines.
- t. Describe and explain the types and principles of antennas and wave propagation.
- u. Explain the purpose, use, and hardware in a satellite communication system.

OUTLINE OF INSTRUCTION:

- I. Electronic Communication Systems
 - A. Communication system concepts
 - B. Noise, bandwidth, gain, attenuation, and decibels
 - C. Fundamentals of electronic RLC tuned circuit filters
 - D. Communication applications

- II. Modulation
 - A. The need for modulation
 - B. Amplitude modulation
 - C. Pulse modulation
 - D. Frequency modulation

- III. Amplitude Modulation
 - A. Concept of AM
 - B. Modulation index and percentage
 - C. Frequency components in AM wave
 - D. Power components in AM wave
 - E. Single-sideband modulation
 - F. AM demodulation circuits

- IV. Frequency Modulation
 - A. Concept of FM
 - B. Concept of PM
 - C. Modulation index, Bessel coefficient and sideband of FM
 - D. Bandwidth of the FM signal
 - E. FM versus AM

- V. Digital Communication Systems
 - A. Digital communication techniques
 - B. Multiplexing and demultiplexing
 - C. Binary data in the communication systems

- VI. Network Communications
 - A. Network concepts
 - B. Local area network software
 - C. Local area network circuits

- VII. Transmission and Propagation
 - A. Transmission lines
 - B. Waves and antennas

- VIII. Telecommunication Systems
 - A. Satellite communications
 - B. Telephone systems
 - C. Paging systems

- IX. Television
 - A. TV fundamentals
 - B. Cable and satellite TV
 - C. High definition TV

REQUIRED TEXTBOOKS AND MATERIALS:

Frenzel, Louis. Principles of Electronic Communication Systems.

Frenzel, Louis. Laboratory manual for Principles of Electronic Communication Systems.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.