
References:

Course Description: Amplitude and frequency modulation systems. The sampling theorem. Time and Frequency division multiplexing; spectral design considerations. Introduction to information theory. Digital source encoding, quantization, waveshaping and intersymbol interference. Analysis and design of digital modulators and detectors. Probability of error analysis. Channel capacity; block and convolutional codes (3-0-3).

Prerequisites: ECE 308, ECE 475 OR MATH 475 (Probabilities)
- Understanding of signals and systems (continuous and discrete).
- Integral and differential calculus
- Basic probability theory

Course Objectives:
- Understanding of analog communication systems
- Determine the minimum sampling rate, bit-rate, and bandwidth needed for a digital communication system
- Understanding of digital communication systems
- Understanding of block and convolutional codes
- Performance of digital communication systems, uncoded/coded
Course Outline:

**Introduction**
- Overview of a Communication System
- Signals and Linear Systems
- Random Variable and Processes

**Analog Signal Transmission and Reception**
- Amplitude and Angle Modulation
- Effect of Noise in Analog Communication Systems

**Information Sources and Source Coding**
- Modeling of Information Sources
- Source Coding Theorem and Algorithms
- Quantization
- Waveform Coding

**Digital Transmission through an Additive Gaussian Noise Channel**
- Pulse Amplitude Modulation
- Two-dimensional and Multi-dimensional Formats
- Signal waveforms
- Optimum Receiver
- Probability of Error

**Channel Capacity and Coding**
- Channel Capacity
- Linear Block Codes
- Convolutional Codes

**Grading.**

- Coursework will be graded as follows:
  - Homework: TBA
  - Project/Exam 1: TBA
  - Exams 2: TBA
  - Project: TBA
  - Final exam: TBA

**Grade Policy:** A (≥ 90%); B (80 - 89%); C (66 - 79%); D (50 - 65%)

HW should be submitted using the Digital Dropbox (Blackboard) before the beginning of the class on Mondays before the class (only soft copies). Homework solutions will be posted in the Blackboard on Fridays. No late HW will be accepted without previous instructor consent.