Office: SH – 141, 312-567-6810
e-mail: atkin@iit.edu
Office Hours: M and W: 5:30 to 7:00 PM or by appointment
Class Hours: M and W: 3:15 to 4:30 PM, WH – 115


References:

Prerequisites: ECE 511, ECE 513


Course outline (sections of):

Elements of a Digital Communications System and Information Theory
- Model of a Digital Communication System
- A Logarithmic Measure for Information
- Review of Sources, Source Models and Source Encoding
- Rate Distortion Function – Vector Quantization

Characterization of Signals and Systems
- Representation of Bandpass Signals and Systems
- Review of Representation of Digitally Modulated Signal (Memoryless)
- Linear Modulation with Memory
Non-linear Modulation Methods with Memory (CPFSK & CPM)
Spectral Characteristics of Digitally Modulated Signals

**Modulation and Demodulation for the AWGN Channel**
- Review of Optimum Receivers and its Performance for Signals Corrupted by AWGN
- Optimum Receiver for CPM Signals
- Optimum Demodulation for Signals with Random Phase in Additive Gaussian Noise

**Channel Capacity and Coding** *(Performance Evaluation)*
- Channel Models and Channel Capacity
- Random Selection of Codes
- Review of Linear Block Codes and Convolutional Codes
  - Nonbinary Block Codes and Concatenated Block Codes
  - Other decoding Algorithms for Convolutional Codes (Sequential, SOVA)
- Performance Evaluation of Block and Convolutional codes
  - Hard and Soft Decision

**Carrier and Symbol Synchronization**
- Signal Parameter Estimation
- Carrier Phase estimation
- Symbol Timing Estimation

**Signal Design for Band Limited Channels**
- Characterization of Band Limited Channels
- Signal Design for Band Limited Channels
- Performance Evaluation
- Modulation Codes for Spectrum Shaping (Line Coding)

**Equalization**
- Linear equalization
- Decision Feedback Equalization
- Adaptive Linear Equalizers

**Grading.**
Coursework will be graded as follows:
- Homework 15% (every week, due Mondays)
- Exams 1 30% (TBA)
- Exams 2 30% (TBA)
- Final exam 25% (TBA)

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

HW should be submitted at the beginning of the class on Mondays (hard copies) or using the Digital Dropbox (Blackboard) for MC students and on Wednesdays 5:00 PM for all other sections (only soft copies). Homework solutions will be posted in the Blackboard on Thursdays. No late HW will be accepted without previous instructor consent.