ELEG 5663 Communication Systems
Course Syllabus

General Information: Instructor: Jingxian Wu
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Required Material:
- Textbook: "Digital Communications: Fundamentals and Applications", 2nd Ed., Bernard Sklar, Prentice Hall, 2001.
- Software: Matlab with Signal Processing Toolbox

Reference: "Digital Communications," 5th Ed., John Proakis, McGraw-Hill, 2007. (Optional)

Prerequisites: Signal and System, Probability and Random Process
- Familiar with Matlab Programming
- Knowledge of linear time invariant system, Fourier series and transform, Laplace transform, time domain and frequency domain representation of signals, power spectrum density, and energy spectrum density of deterministic signals
- Knowledge of discrete and continuous random variable, probability mass function, probability density function, moments of random variables, moment generating function
- Knowledge of random process, wide sense stationary random process, auto-correlation function, power spectrum density of random signals
- Knowledge of modulation and demodulation

Learning Objectives: To understand the difference of analog and digital communication systems, to understand the operation and theory of digital communication systems, to be able to analyze optimum receivers for various digital modulations in additive white Gaussian noise channel, to understand the theories and practice of channel coding, to be able to implement digital communication systems .

Grading:
- Test 1 (Chs. 0 – 3) 35%
- Test 2 (Chs. 4, 5, 6, 11) 35%
- Homework 30%
- Projects (Optional)

- A: $90 \leq \text{grade} \leq 100$
- B: $80 \leq \text{grade} < 90$
- C: $70 \leq \text{grade} < 80$
- D: $60 \leq \text{grade} < 70$
- F: $0 \leq \text{grade} < 60$

- Due dates for homework and lab report will be strictly enforced. Late submission within one week after due date will receive a 20% grade deduction, and no credit if submitted after one week from the due date.
- If for some legitimate reason (sickness, death in the family, etc.), you cannot take an **exam** on the scheduled day, you must notify the instructor **prior** to the exam.

Online Resources:
- Course materials (Slides, Homework, Projects, References, etc) can be found at https://wuj.hosted.uark.edu/teaching/eleg5663/eleg56638w.html
- Please check course website **at least once per week** for updates.

Academic Honesty: Academic honesty is fundamental to the activities of an academic institution and success of students. Any form of copy and plagiarism will not be tolerated in this class. Any kind of activities related to academic dishonesty will be dealt with on a case-by-case basis and may be grounds for dismissal from the class.

Tentative Schedule:

- Week 1: Signals and Spectra (Ch. 1)
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- Week 2: Baseband Formatting/Modulation (Ch. 2)
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- Week 3: Baseband Optimum Detection (Ch. 3)
- Week 3: Baseband Optimum Detection (Ch. 3)
- Week 4: Baseband Optimum Detection (Ch. 3)
- Week 4: Bandpass Mod/Demod (Ch. 4)
- Week 5: Bandpass Mod/Demod (Ch. 4)
- Week 5: Communication Link Analysis (Ch. 5)
- Week 6: Communication Link Analysis (Ch. 5)
- Week 6: Channel Coding (Ch. 6)
- Week 7: Channel Coding (Ch. 6)
- Week 7: Coding and Modulation Tradeoff (Ch. 6, Ch. 9)
- Week 8: Coding and Modulation Tradeoff (Ch. 6, Ch. 9)

Project Schedule:

- Project 1: Random Variable and Random Process
- Project 2: BER of Binary Signaling
- Project 3: Equalization
- Project 4: BER of MQAM
- Project 5: Channel Coding
- Project 6: Coding and Modulation Tradeoff

The above schedule is subject to change without prior notice.