EE 512 Course Syllabus

Digital Communication Systems

January 14, 2015

Instructor: Laurence Hassebrook
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URL: http://www.engr.uky.edu/~lgh/classes/classes.htm
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Lab: 209 CRMS Bldg.
Office hours: 3 pm to 4 pm, M (209 CRMS lab), W (209 CRMS lab) and F (209 CRMS lab or 219 Marksbury)
TA: none
Class Hours and Location: 2:00pm-2:50pm MWF, FPAT 265


PREREQUISITE:
EE421G and engineering standing or consent of instructor.
Course is compliant with Departmental Baseline

OUTCOMES
Students completing this course should demonstrate the:
1. Knowledge of operations and issues associated with digitization and information transmission: sampling, encoding, quantization, distortion, channel capacity, and matched filtering.
2. Ability to determine sampling rate, distortion, and transmission bit rate in a digital communication system.
3. Ability to analyze digital modulation techniques and digital transmission media.
4. Ability to design basic digital communications systems.

CLASS CONTENT AND OBJECTIVES

The content of "Digital Communication Systems" represents the basic knowledge necessary for sampling, encoding, transmitting, receiving, decoding, and conversion of digital information using today's digital communication technologies.

This course will cover selected material in Chapters 5 through 11 of the textbook. Concepts that will be studied include selected material from the Fourier transform, probability, random signals/noise, spectral analysis, information theory, sampling theory, encoding/decoding and digital signal modulation/demodulation. Matched filtering and quadrature detection for binary demodulation will be studied. Sampling theory will cover impulse and flat top sampling techniques. The modulation techniques covered will include On/Off Keying (OOK), Phase Shift Keying (PSK), Frequency Shift Keying (FSK), Direct Sequence Spread Spectrum (DSSS) and quadrature modulation and demodulation. Information theory will include topics of Channel Capacity, Entropy, and be applied to encoding/decoding techniques. Homework will be in the form of problem sets and MATLAB based visualizations or tutorials.

Grading Policy:
Homework: 20%: Once a week, Due one week after assignment, No late homework, drop the lowest 1. Assignments may include MATLAB visualizations.

Exam 1: 20% (Date to be announced, closed book, 1 page crib sheet).

Exam 2: 20% (Date to be announced, open book).

Exam 3: 20% (Friday before Dead Week, open book).

Projects and Final Project: 20%

In accordance with SACS Recommendation 10 in the Provost memo dated March 12, 2004, graduate students will have a different grade scale then undergraduate students.

Reference:

3. Digital Communication by E. A. Lee and D. G. Messerschmitt.

Equipment Required: Access to MATLAB, email and the web.

Infrastructure Required: The students will be required to obtain computer accounts to enable them to communicate with email, run MATLAB and read web pages. Communications to the students will be done by the EE512 web page and also through the EE512 email list. Individual correspondence by email will be encouraged.