EE421: Communication Systems I

Fall 2006

Instructor:
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Teaching Assistant:
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Lectures:
Tu, Tr 4:10-5:30, Howe 1344

Office Hours:
Instructor: Tr 10-12AM
TA: Tu 2-4PM

Course Website:
WebCT:EE421_1

Course Description:
This is an introductory course on communication systems for undergraduate students, covering basic Fourier techniques and the use of these techniques in the analysis and design of communication systems. Specific topics covered in the class include Fourier transforms and Fourier series, time domain and frequency domain analysis, amplitude modulation (AM), frequency modulation (FM), pulse modulations and digital data transmission.

Course Objectives:

Objective 1	:	Name the components of a communication system and draw a block diagram
Objective 2	:	Apply Fourier transform to the analysis of communication systems
Objective 3	:	Recognize and understand common modulation schemes for continuous-wave modulation including amplitude modulation, frequency modulation, and phase modulation.
Objective 4	:	Be able to describe the implementation and effect of basic demodulation techniques for continuous-wave modulation
Objective 5	:	Recognize and understand common analog pulse modulation schemes including pulse-amplitude modulation, pulse-width modulation, and pulse-position modulation
Objective 6	:	Recognize and understand common digital pulse modulation schemes including delta modulation and pulse-code modulation
Objective 7	:	Recognize and understand digital data transmission techniques including line coding, pulse shaping, and equalization

Prerequisite:
EE224 (Signals and Systems I)

Text:

B.P.Lathi, Modern Digital and Analog Communication Systems, 3rd Ed., Oxford University Press, 1998.

Tentative Course Outline:

1. Introduction (Ch.1)
    - Block Diagram of Communication System
    - Analog and Digital Signals
    - Channel Characteristics
    - Power, Bandwidth
    - Shannon's Capacity Limit
2. Review of Signals and Systems (Ch.2-3)
    - Linear Time-Invariant System
    - Fourier Series
    - Fourier Transform
    - Power Spectral Density and Correlation
3. Amplitude Modulation (Ch.4)
    - Double Sideband (DSB), AM
    - Power Efficiency
    - Modulation and Demodulation
    - Quadrature AM
    - Single Sideband (SSB) Modulation
    - Vestigial-Sideband (VSB) Modulation
    - Phase-Locked Loop
    - Super-heterodyne Receiver
4. Angle Modulation (Ch.5)
    - PM and FM
    - Bandwidth
    - FM Modulation and Demodulation
    - Interference Analysis
    - Preemphasis and Deemphasis
5. Sampling and Pulse Code Modulation (Ch.6)
    - Sampling Theorem
    - Pulse Code Modulation (PCM)
    - Differential PCM
    - Delta Modulation
6. Digital Data Transmission (Ch.7)
    - Line Coding
    - Pulse Shaping
    - Equalizer
    - Multiplexing
7. Emerging Digital Communications and Some Recent Developments (Ch.8&9)
    - Spread Spectrum Communications
    - Wireless Communications

Homework:

Homework will be assigned approximately once a week, and is due a week later. Cheating is not allowed, but discussions are encouraged. *Late homework will not be accepted without prior permission.*

Grading:

Homeworks: 15%
Attendance, Participation, Short-Quizzes: 15%
Exam I: 20%
Exam II: 20%
Final Exam: 30%

Disability Statement :

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me soon. Please request that a Disability Resources (DR) staff send a Student Academic Accommodation Request (SAAR) form verifying your disability and specifying the accommodations you will need. DR is located in Room 1076 of the Student Services Building.