CALIFORNIA STATE UNIVERSITY, FULLERTON
DEPARTMENT OF ELECTRICAL ENGINEERING

Fall 2008

EGEE 443 Electronic Communications (3)

COURSE DESCRIPTION:

electronics → prob and statistics.

Prerequisites: EGEE 310 and EGEE 323.
Principles of amplitude, angular and pulse modulation, representative communication systems, the effect of noise on system performance.

M T W Th 1700 – 17:30
M TH 20:15 – 20:45

INSTRUCTOR: K. HAMIDIAN

OFFICE: E-217

Advising
M T/H 4pm – 5pm

TELEPHONE: 714 – 278-2884

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E-217 office.

OFFICE HOURS: MW: 1700– 17:30 and 2015-2045
TTH : 1700 – 17:30 and 2015-2045

Temporary.

PREREQUISITE TOPICS: Probability, Fourier Transforms, Linear Systems

TEXTBOOK: Intrduction to Analog & Digital Communications, S. Haykin and M.Moher, Wiley, 2007, 2th Edition

REFERENCES:

1) Introduction to Communication Systems, F. Stremler, Addison Wesley, 1982, 2nd edition

2) Digital and Analog Communication Systems, L. Couch, Prentice Hall, 2001, 6th edition.

3) Analog and Digital Communication Systems, M. Roden, Prentice Hall, 1996

get Class notes from book store.

COURSE OUTLINE

WEEKS	TOPICS
5.5	Chapter 1. Introduction, Classification of Signals. Handout
	Chapter 2. Fourier Transform Review, Properties and Applications, Power and Energy Spectral Density. Band-pass Signals and Systems. Hilbert Transforms, Pre-Envelope, Quadrature Representation of Narrow Band Signals. Transmission of Signals Through Linear Systems.
	Chapter 8. Random Processes Stationary Processes. Ergodic Processes. Transmission of a Random Process Through a Linear-Time-Invariant Filter. Power Spectral Density. Gaussian Process Noise, Quadrature Representation of Narrowband Noise. Sine Wave Plus Narrowband Noise.
	MIDTERM 1 (75 MINUTES)
6.0	Chapters 2 and 9. Amplitude Modulation Introduction, Amplitude Modulation (AM), Double Sidebanb-Suppresed Carrier (DSBSC), Single Sideband (SSB), Vestigial Sidband (VSB) Modulation. Noise in Linear Receivers, Noise in AM Receivers. Frequency-Division Multiplexing.
	Chapters 4 and 9. Angle Modulation Frequency Modulation (FM), Phase Modulation (PM).Generation of FM wave. Demodulation of FM wave. Noise in FM Receivers.
	MIDTERM 2 (75 MINUTES)
1.5	Chapter 5. Pulse Modulation: Transition from Analog to Digital Communication. Sampling Process. Pulse-Amplitude Modulation (PAM). Quantization Process. Pulse-Code Modulation (PCM). Time-Division Multiplexing, Digital Multiplexers. Delta Modulation.

1.0	Chapter 6. Baseband Tranmission Intersymbol Interference, Nyquist's Criterion for Distortionless Transmission, Baseband M-ary PAM Transmission, Optimum Linear Receiver.
1.0	Chapter 7. Passband Digital Transmission Coherent Phase-Shift Keying, Coherent Frequency-Shift Keying, Hybrid Amplitude/Phase Modulation, Detection of Signals with Unknown Phase. Noncoherent Orthogonal Modulation, Differential Phase-Shift Keying.
0.5	FINAL EXAM (110 MINUTES)

Grading Policy

(1) Grades will be assigned based on the class curve.

(2) A performance around the average class performance will earn a B-; a performance superior to the class mean will earn a B or B+ and a very superior performance will gain an A- or A. A performance inferior to the class mean will earn a C and a very inferior performance a D or an F.

HOMEWORK (including computer work)	12%
MIDTERMS	53%
FINAL EXAM	35%

EXAMS CANNOT BE MISSED.

HOMEWORK WILL BE ASSIGNED EVERY THURSDAY AND WILL BE DUE THE FOLLOWING THURSDAY.

HOMEWORK MUST BE TURNED IN ON TIME AND CLEAN FORMAT.

COURSE LEARNING OBJECTIVES:

The course is devoted to the study of principles of communication theory as applied to the transmission of information. The focus is on the basic issues, relating theory to practice wherever possible. At the end of this introductory course in communication, student should understand and be able to apply the following to calculate and solve engineering problems in communication area:

1) Classical method for frequency analysis: Fourier transform and Fourier Series.

2) Spectral density and correlation functions of energy signals and power signals.

3) Using various techniques to find the energy and the power of a given signal.

4) Transmission of signals through linear filters and channel.

5) Hilbert transform and its application. Concept of pre-envelope, complex envelope and envelope and their applications.

6) Evaluating the response of a band-pass filter or channel to a band-pass signal.
7) Random processes. Transmission of a random process through a linear time invariant system. Gaussian process. Quadrature representation of a narrow-band noise.

8) Mathematical descriptions and the spectral characteristics of: amplitude modulation, frequency modulation and phase modulation. Frequency division multiplexing. Demodulation of AM, FM and PM signals.

9. Effect of noise in communication systems. Noise in CW modulation system. Noise in AM and FM receivers.

10. Sampling Theorem. Pulse-Amplitude Modulation (PAM). Pulse-Code Modulation (PCM). Quantization Process. Time Division Multiplexing (TDM).

11. Baseband Data Transmission. Band-pass data transmission. Digital modulation techniques such as PSK, FSK and ASK.

ASSESSENT OF STUDENTS' LEARNING:

At the end of the semester, the effect of this course on students' learning will be assessed based on the following criteria:

- The ability to apply knowledge of mathematics, science and engineering.
- The ability to design a system, component, or a process to meet desired needs.
- The ability to identify, formulate and solve engineering problems.
- A recognition of the need for, and an ability to engage in life-long learning.
- The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.