Department of Electrical & Computer Engineering
University of California, Santa Barbara

ECE 146A
Winter 2008
Shynk
H.O. #2

ECE 146A: ANALOG COMMUNICATION THEORY AND TECHNIQUES
TENTATIVE COURSE OUTLINE

REVIEW OF SIGNALS AND SYSTEMS

- Random and deterministic signals
- Signal power and energy
- Channel bandwidth
- Signal-to-noise ratio
- Fourier transform
- Rayleigh's energy theorem
- Linear systems
- Hilbert transform
- Pre-envelope and complex envelope
- Bandpass signals and systems
- Quadrature and polar forms
- Phase and group delay

AMPLITUDE MODULATION

- Amplitude modulation with carrier
- Amplitude sensitivity and overmodulation
- Switching modulator
- Fourier series reviewed
- Commercial AM radio
- Envelope detector
- Double-sideband suppressed-carrier modulation
- Double-balanced modulator
- Coherent and noncoherent demodulation
- Quadrature amplitude modulation
- Filtering sidebands
- Single-sideband amplitude modulation
- Vestigial sideband modulation
- Frequency division multiplexing

ANGLE MODULATION

- Phase modulation
- Frequency modulation
- Narrowband and wideband FM
- Commercial FM radio
- Bessel functions
- Modulation index
- Transmission bandwidth
- Balanced frequency discriminator
- Phase-locked loop
- Superheterodyne receiver

REVIEW OF RANDOM PROCESSES

- Gaussian random variable
- Conditional probability
- Stationarity and ergodicity
- Correlation and covariance
- Power spectral density
- Gaussian process
- White Gaussian noise
- Narrowband noise

NOISE IN CONTINUOUS-WAVE MODULATION SYSTEMS

- Receiver model
- Signal-to-noise ratio
- Receiver figure of merit
- Noise in DSB-SC receivers
- Noise in SSB receivers
- Noise in AM receivers
- Phasor diagram
- Noise in FM receivers
- Pre-emphasis and de-emphasis