

University of Illinois at Urbana-Champaign  
Department of Electrical and Computer Engineering

ECE 359: COMMUNICATIONS I

Fall 2001

Information Sheet

Issued: Thursday, August 23rd.

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<b>Instructor:</b>	Christoforos Hadjicostis 148 CSL Phone: 265-8259 e-mail: chadjic@uiuc.edu
<b>Teaching Assistant:</b>	Chun-Wei Lam 321 Everitt Lab e-mail: clam@uiuc.edu
<b>Time and Place:</b>	Tuesdays and Thursdays, 1:30–2:50pm, 161 Everitt Lab.
<b>Required Textbook:</b>	Simon Haykin, <i>Communication Systems</i> , John Wiley & Sons, 2001 (4th Edition).
<b>Recommended Textbook:</b>	B. P. Lathi, <i>Modern Digital and Analog Communication Systems</i> Oxford University Press, 1998 (3rd Edition).
<b>Office Hours:</b>	Instructor: Tuesdays 3:00–5:00pm (368 Everitt Lab) TA: Wednesdays 2:00–4:00pm and Fridays, 10:00–11:00pm (330N Everitt Lab) Other times by appointment.
<b>Course Web Page:</b>	<a href="http://www.ece.uiuc.edu/ece359/">http://www.ece.uiuc.edu/ece359/</a>
<b>Homework:</b>	Problem sets will normally be assigned on Thursdays and they will be due the following Thursday at the <b>beginning</b> of lecture. Late problem sets will NOT be accepted without prior arrangement.
<b>Exams:</b>	Two mid-semester exams have been scheduled tentatively for September 27th (from 1:30 to 2:50pm, room TBA) and November 8th (from 1:30 to 2:50pm, room TBA). Mid-semester exams will be closed book; <b>one</b> double-sided sheet of notes ( <i>handwritten</i> , 8 1/2" by 11") will be allowed for the first mid-semester exam; <b>two</b> (double-sided, <i>handwritten</i> , 8 1/2" by 11") sheets will be allowed for the second mid-semester.
<b>Final Exam:</b>	The final exam will take place on Friday, December 14th from 7:00-10:00pm (room 161 Everitt). The exam will be <i>closed book</i> , but you can use <b>three</b> sheets of <i>handwritten</i> notes (double-sided, 8 1/2" by 11"). Calculators, laptop computers, handhelds, etc. should not be necessary, but you will be allowed to bring a <i>calculator</i> to the exam.
<b>Grading:</b>	Two mid-semester exams (25% each), Homework (10%), Final Exam (40%).

## Course Outline

### I. Representation of Signals and Systems (5 lectures)

- Introduction to communication systems
- Review of linear system theory, Fourier transform theory
- Hilbert transform, bandpass systems
- Group/phase delay

### II. Analog Modulation Schemes (5 lectures)

- Amplitude Modulation (AM) schemes
- Frequency and Phase Modulation (FM, PM) schemes
- Phase locked loops

### III. Random Processes (8 lectures)

- Review of probability
- Hypothesis testing, detection and estimation
- Random processes
- Stationarity, wide sense stationarity
- Random processes through linear filters
- Mean, autocorrelation and autocovariance functions
- Gaussian random processes, linear filtering of Gaussian random processes
- Frequency analysis, power spectral density
- Noise, narrow band noise, channel models

### IV. Noise in Analog Modulation (3 lectures)

- Signal-to-noise ratios in AM schemes
- Signal-to-noise ratios in FM schemes

### V. Digital Communications (6 lectures)

- Sampling
- Pulse code modulation, quantization
- Baseband pulse transmission, matched filtering, error detection probability
- Intersymbol interference
- Digital passband transmission (PSK, QPSK)

### VI. Exams (2 lectures)