

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

ECE 459: COMMUNICATIONS I

Fall 2005

Information Sheet

Issued: Thursday, August 25th.

Instructor:	Christoforos Hadjicostis 357CSL Phone: 265-8259 E-mail: chadjic@uiuc.edu
Teaching Assistants:	Andrew Cheng E-mail: accheng@uiuc.edu Anthony Halley E-mail: ahalley2@uiuc.edu
Time and Place:	Tuesdays and Thursdays, 1:30–2:50pm, 165EL.
Required Textbook:	B. P. Lathi, <i>Modern Digital and Analog Communication Systems</i> , Oxford University Press, 1998 (3rd Edition).
Recommended Textbooks:	(i) Simon Haykin, <i>Communication Systems</i> , John Wiley & Sons, 2001 (4th Edition). (ii) J. G. Proakis and M. Salehi, <i>Communication Systems Engineering</i> , Prentice Hall, 2002 (2nd Edition).
Office Hours:	CH: Tuesdays, 3:00–5:00pm (351 CSL or 357 CSL) AC: Mondays, 9:30–11:00am and Wednesdays, 11:00–12:30pm (330A EL) AH: Mondays, 1:00–2:30pm and Wednesdays, 3:30–5:00pm (330A EL) Other times by appointment.
Course Web Page:	http://courses.ece.uiuc.edu/ece459/
Homework:	Problem sets will normally be assigned on Thursdays and they will be due the following Thursday at the beginning of lecture. Late problem sets will NOT be accepted without prior arrangement.
Exams:	Two mid-semester exams have been scheduled tentatively for October 6th (from 5:00 to 7:00pm, room TBA) and November 10th (from 5:00 to 7:00pm, room TBA). Mid-semester exams will be closed book; <i>one</i> double-sided sheet of notes (<i>handwritten</i> , 8 1/2" by 11") will be allowed for the first mid-semester exam; <i>two</i> (double-sided, <i>handwritten</i> , 8 1/2" by 11") sheets will be allowed for the second mid-semester exam.
Final Exam:	The final exam will take place on Saturday, December 17th from 1:30 to 4:30pm in Room 165EL. The exam will be <i>closed book</i> , but you can use three 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.
Grading:	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
- Bandpass systems, Hilbert transform
- 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 (6 lectures)

- Hypothesis testing, Detection and estimation
- Random processes, Stationarity, Wide sense stationarity
- Random processes through linear filters
- Gaussian random processes, Linear filtering of Gaussian random processes
- Frequency analysis, Power spectral density
- Noise, Narrow band noise

IV. Noise in Analog Modulation (3 lectures)

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

V. Digital Communications (8 lectures)

- Pulse amplitude modulation, Intersymbol interference
- Information sources, Source-coding
- Quantization, Pulse code modulation
- Baseband pulse transmission, Matched filtering, Error detection probability
- Digital passband transmission (PSK, QPSK)

VI. Exams (2 lectures)