

EC2500 – Communication Systems

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 office hours: posted or by appointment

Text: Analog and Digital Communication Systems, 5th Ed., M. Roden, Discovery Press, 2004.
 Optional: Contemporary Communication Systems with Matlab, Proakis, Thomson Pub., 2004.

Course objectives: At the end of the course, the student will have 1) A knowledge of time and frequency descriptions of analog and digital messages in communications; 2) An understanding of the implementation of modulators and demodulators.

Grades: 3 tests, each worth 17.5% (total of 52.5%)
 1 comprehensive final, worth 17.5%
 laboratories, worth 30%

HWs: A few problems will be assigned on a regular basis to apply the various concepts covered in the classroom, and solution will be made available. Hws will not be collected, however they constitute an essential part of the learning process for the course. You are responsible for working the problems without looking at the solutions first, so that you learn how to approach the problems. You are encouraged to work the problems regularly as they get assigned to facilitate the understanding of the concepts covered in class.

Exams: All exams will be closed books/notes. A week before each exam, I will make available a “list of things to know” listing detailed specific topics which you will be responsible for. You are strongly encouraged to insure that you are clear on all topics contained.

You will be allowed to bring in one one-sided (8.5*11") sheet on which you may write whatever you feel may be useful to you. For the final you will be allowed to a two-sided (8.5*11") sheet of notes. Depending on the exam questions, a portion of each exam may be done as take home overnights to allow you access to MATLAB.

You are reminded that exams represent individual work of each student only, and that no cooperation of any kind will be allowed on any EC2500 exam. Honor code rules are to be strictly adhered to, and will be enforced by the instructor.

test 1: 10/20/03; **test 2:** 11/17/03; **test 3:** 12/08/03

Labs: A set of three experimental laboratories is scheduled in the communication laboratory. The purpose of the labs is to familiarize you with communication equipment, study basic AM and FM schemes. The laboratories and the reports are to be done in teams of two individuals (only one team of three will be allowed if we have an odd number of students in the course).

You are encouraged to discuss the lab work with other groups. However, laboratory reports are to contain data collected only by the team turning in the report. Data from other groups is not to be used in the report. Other lab reports are not to be copied and reports turned in should be containing work of the team only.

Course outline

Introduction:

Signal types, sampling, Shannon theorem, review of Fourier transform and series concepts

Lab 1

Baseband transmission:

Analog: PAM, TDM, ISI, PWM, PPM
 Digital: Signal formats, PCM, M-ary baseband, Delta
 Receivers: Discrete baseband reception, matched filter detector
 Bit error rate
 Applications to the CD

Amplitude modulation (AM)

Double sideband suppressed & transmitted carrier
 Single sideband & Vestigial sideband
 ASK and M-ASK
 Modulators: double sideband, gated modulator, square law modulator, single sideband modulator, vestigial

sideband modulator

Demodulators: coherent demodulation, incoherent demodulation

Broadcast AM

Lab 2

Frequency modulation (FM)

Instantaneous frequency
 Narrowband & wideband FM
 Frequency shift keying (FSK) and M-FSK
 Modulators & demodulators
 Broadcast FM & FM stereo

Lab 3

Phase modulation (PM)

Analog & digital phase modulation
 Modulators & demodulators