

EE 455 Digital Communications Spring 2002

Instructor: C.N. Georghiades, 237C, WERC.

Office hours: MWF, 11:00-12:00 PM, T Th: 2:00-3:00 PM

Web Page: <http://ee.tamu.edu/~georghia/courses/courses.htm>

Reference Textbooks

1. J.G. Proakis and M. Salehi, *Communication Systems Engineering*, 2nd Edition, Prentice Hall, 2002 (assigned text).
2. S. Haykin, *Communication Systems 3/e*, Wiley, 1994.
3. F.G. Stremler, *Introduction to Communication Systems*, Addison-Wesley, 1990.
4. S. Haykin, *An Introduction to Analog and Digital Communications*, Wiley, 1989.
5. M.S. Roden, *Digital Communication Systems Design*, Prentice Hall, 1988.
6. B. Sklar, *Digital Communications, Fundamentals and Applications*, Prentice Hall, 1988.
7. M. Schwartz, *Information Transmission, Modulation and Noise*, 4th edition, McGraw-Hill, 1986.

Course Outline

1. Introduction, digital versus analog, overview of digital communication systems
2. Some probability theory
 - a) Probability space, random variables, density and distribution functions, independence
 - b) Expectation, conditional expectation, Bayes' rule
 - c) Stochastic processes, autocorrelation functions, stationarity, ergodicity, spectral density
3. Source coding, sampling, quantization, companding, PCM, delta modulation
4. Communication channels, noise, bandwidth, memoryless channels, AWGN channels
5. Modulation, optimal receiver principles, signal design, probability of error
 - a) Maximum-likelihood receivers
 - b) Orthogonal, simplex and other signals
 - c) PSK, FSK, ASK
6. Channel coding
 - a) Block coding
 - b) Convolutional coding, the Viterbi algorithm
 - c) Coded-modulation
7. Bandlimited channels
 - a) Intersymbol interference
 - b) Spectral shaping, equalization
 - c) Partial response signaling
8. Spread-spectrum communications

Grade Distribution

15% for homework; 25% for each of two exams; 35% for final.

Homework Policy: Please hand in homework on time. No late homework will be accepted, as solutions will be provided soon after the homework is due.