

EE 473 - Communication Systems Design

1997-1999	EE 473-4. Communication Systems Design. The concepts of probability are
Catalog Data	reviewed and extended to treat random process theory. The techniques of probability are then used to introduce the essential ideas of information theory. The baseband digital PCM technique is covered in detail and the most important digital RF modems are considered as well. A brief introduction to communication networks is also provided. 3 hours lecture, 2 hours lab. Prerequisites: STT 363 & EE 421.
Textbook	Stremmer, <i>Introduction to Communication Systems</i> , 3rd edition, 1990, A-W
Coordinator	William S. McCormick, Associate Professor of Electrical Engineering
Goals	This course is intended to develop the analysis skills required to support the communication sequence capstone design course, EE 476. By providing a broad background in linear systems, noise theory, and digital communication techniques, EE 473 will enable the student to address an unstructured design problem in the communication area.
Topical Prerequisites	Each student should <ul style="list-style-type: none"><input type="checkbox"/> understand the basic concepts of linear system theory<input type="checkbox"/> be familiar with the essential ideas of probability<input type="checkbox"/> have some familiarity with the concepts of modulation, channel capacity, and Nyquist sampling<input type="checkbox"/> have some exposure to Matlab programming
Learning Objectives	Each student should be able <ul style="list-style-type: none"><input type="checkbox"/> to understand the communication implications of the law of large numbers, probability of bit error and the central limit theorem<input type="checkbox"/> to understand random process theory and to be able to apply linear system and random process theory in the analysis of digital communications<input type="checkbox"/> to appreciate some basic concepts of information theory; in particular to be able to work with the ideas of entropy, source encoding and channel capacity<input type="checkbox"/> to be able to analyze the bandwidth and probability of error properties of various digital modems; e.g., OOK, FSK, QPSK, QAM<input type="checkbox"/> to understand the zero intersymbol interference property of the Nyquist waveforms and to also become familiar with the classical matched filter<input type="checkbox"/> to feel comfortable working in an unstructured lab environment where creativity and innovation are encouraged
Computer Usage	Word processing, viewgraph development, reference search.

Laboratory

The weekly, two-hour EE 473/673 lab will consist of a series of Matlab-based experiments that will cover the following topics: basic probability and random process theory, bandwidth efficient symbol waveforms and the zero-intersymbol interference condition, the sampling theorem, PCM companding, digital modulation techniques and the effects of error correcting codes. The lab climate will be informal with structure de-emphasized and creativity emphasized.

**Estimated ABET
Category Content**

Engineering Science 3 credits or 75%
Engineering Design 1 credit or 25%

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