

EE 343L Communication Systems Lab

Credits: 1

Categorization of credits: engineering topic

Instructors: A. Kuh, A. Host-Madsen, N. Prasad Santhanam

Text Book and Other Required Materials: Digital and Analog Communication Systems Lab Handouts

Designation: Required for Systems Track students and elective for others.

Catalog Description: Experiments illustrating the basic principles of communication systems

Pre-requisites: EE 315 Signal and Systems Analysis, EE 342 Probability and Statistics (corequisite), EE343 Introduction to Communication Systems (corequisite)

Class/Lab Schedule: one 3 hour laboratory per week

Topics Covered:

Lab is taken concurrently with EE343 and gives students practical and computer simulation experience. There is one preliminary writing assignment and nine labs covering:

- Introductory essay on Shannon (1 week)
- Fourier Analysis, linear time invariant systems, distortion (2 week)
- Amplitude Modulation and Frequency Division multiplexing (2 weeks)
- Sampling and Time division multiplexing (1 week)
- Probability and Random Variable applications in communications (1 week)
- Quantization and Pulse Code Modulation (1 week)
- Pulse Shaping (1 week)
- Matched Filters (1 week)
- Performance of Digital Communication Systems (2 weeks)
- Spread Spectrum Systems and Code Division Multiplexing (1 week)

Course Objectives and Their Relationship to Program Objectives:

This lab course complements EE343 as students conduct experiments with signals, systems, and communication systems. Systems are built and verified through MATLAB and analytically. [Program Objectives this course addresses: 1, 2, and 3.]

Course Outcomes and Their Relationship to Program Outcomes:

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in square braces "[]") they address:

- The course is a writing intensive course and addresses writing styles, organization, and content. Feedback will be provided to students about their writing performance with goals of improvement. [3]
- The introductory essay is on Claude Shannon and addresses issues of how digital communications became an important component in daily life. [4]
- Laboratories have students programming in MATLAB to understand different aspects of analog and digital communications. This includes the design of communication transmitters and receivers including the tradeoffs between communication system performance and complexity. The laboratory on digital communication systems studies different digital modulations systems and looks at the performance of the communication systems along with the complexity of the transmitter and receiver. [1, 2, 4, 6]

Contribution of Course to Meeting the Professional Component

Engineering topics: 100%

Computer Usage:

Students use MATLAB to design and simulate different communication systems and study signal and system properties.

Design Credits and Features:

EE 343L has 1 unit of design credit. In the laboratories, students design and build different communications systems using MATLAB tools.

Person(s) preparing syllabi and date: A. Kuh Oct. 7, 2014, Yingfei Dong, June 14, 2021.