

COURSE OUTLINE

Course: EE467, Introduction to Communications

Instructor: Prof. Alan Willner

Objective: To obtain a familiarity with many basic concepts pertaining to analog and digital transmission of information. The material is beneficial to many areas of electrical engineering.

Room: Online remote by Zoom, <https://usc.zoom.us/j/9953241390>

Hours: 12:30 - 1:50 pm, Tues. and Thurs.

Office: Rm. EEB 538, 213-740-4664, F: 740-8729, (Home) (310) 839-3327, willner@usc.edu

Office Hours: Tues: 11:00-12:15 pm, or by appointment

Required Text: Analog and Digital Communication Systems, 5th Ed., M.S. Roden, Prentice Hall

Other Suggested Texts: If possible, these will be on reserve in Seaver Science & Eng. Library

1. Communication Systems (3rd Ed.), A. Bruce Carlson
2. Information, Transmission, Modulation, and Noise, M. Schwartz
3. Communication Systems (2nd Ed.), S. Haykin
4. Digital and Analog Communication Systems, K.S. Shanmugam

Prerequisite: EE201/301 - Intro. to Linear Systems

Suggested Co-requisite: EE364/464 - Probability Theory

Attendance: Class attendance is ***Mandatory***

Grading: There will be 5 problem sets, a mid-semester exam, a final exam, and an oral and written presentation. Attendance policy related to grading will be discussed in class.

25%	- Midterm
10%	- Homework
25%	- Oral and Written Presentations
40%	- Final
100%	- Total

Homework will be graded on a 0,1,2,3,4 scale.

Description: This course will introduce students to the exciting and rapidly evolving scientific field of data communications. The basic concepts of communication systems will be presented. We will discuss signal modulation and demodulation (e.g. AM and FM), information encoding and decoding, multiplexing of many channels, system noise and error rates, spectral analysis, and signal power. Both analog and digital communications will be discussed. Relevant information-transfer systems will be reviewed, such as radio, telephone, satellite, cellular, and fiber optic.

LECTURES

I. Background Material

- A. Transform Theory
- B. Spectral Transfer Functions
- C. Probability Theory

II. Analog Transmission

- A. Amplitude Modulation
- B. Frequency Modulation
- C. Phase Modulation
- D. Demodulation Techniques
- E. Pulse Modulation

III. Digital Transmission

- A. Modulation Formats (ASK, FSK, PSK, QAM)
- B. Transmission
- C. Reception (Signal-to-noise Ratios, Bit-Error Rates, Data Constellation)

IV. Present-Day Systems (Oral and Written Student Presentations)

Cellular, Personal Wireless, Satellite, Fiber Optic Systems, Broadband Networks, High-Definition Television, Data Coding, Data Compression, Internet, Ethernet, Sensors, Radar, Lidar, Video Conferencing, Quantum Communications, Internet of Things, High-Speed Interconnections, etc.