

EE-3150

Communications Science

Catalog Description:

Communications Science Introduces the mathematical theory of communication science. Topics include baseband pulse and digital signaling, bandpass signaling, AM and FM systems, bandpass digital systems. Credits: 3.0 Lec-Rec: (3-0-0) Semesters Offered: Fall Spring

Prerequisites: EE 2160 and MA 3720

Textbooks(s) and/or Other Required Materials:

Haykin, Simon, *Communication Systems, 4th Edition* John Wiley and Sons, New York 2001.

Prerequisites by Topic:

- 1) Familiarity with Fourier series and Fourier Transforms.
- 2) Familiarity with Discrete Probability Theory such as the Binomial Theorem and Random Variables such as Gaussian distributions.
- 3) Familiarity with Linear System Theory such as frequency response and impulse response.

Course Objectives:

- 1) Students shall have mastery of baseband pulse and digital signaling techniques.
- 2) Students shall have mastery of several modulation and demodulation techniques.
- 3) Students shall have familiarity with AM and FM systems.
- 4) Students shall have mastery of bandpass digital signaling techniques.
- 5) Students shall have mastery of link-budgets calculations.
- 6) Students shall have mastery of signal space representation techniques.
- 7) Students shall have a mastery of bandwidth occupancy concepts.

Topics Covered:

- 1) Amplitude Modulation (Commercial AM, DSB-AM, SSB-AM and Vestigial Sideband (TV))
- 2) Frequency Division Multiplexing (FDM)
- 3) Angle Modulation (Commercial FM)
- 4) Receivers (Superheterodyne)
- 5) Sampling Theory (Aliasing, Quantization noise)
- 6) Pulse Code Modulation (PCM)
- 7) Time Division Multiple Access (TDMA)
- 8) Matched Filter
- 9) Signal Space Representation Techniques
- 10) Phase Modulation (BPSK,QPSK ,MPSK and QAM)
- 11) Frequency Shift Keying (FSK)
- 12) Error Correction Coding (FEC)

Relationship of Course to Program Objectives:

- **EE:** Outcome: c via topic(s): all
Outcome: m via topic(s): all
Outcome: n via topic(s): 5,8,9,10,12

Contribution of Course to Meeting the Professional Component:

- Engineering Topics

Class/Laboratory Schedule (each hour = 50 minutes):

- Lecture: 45 hours = 3 hours/week for 15 weeks

Prepared by:

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