## ELEN 4560: Introduction to Communication Systems

**Class Schedule:** 3 credit hours, meeting the equivalent of 3, 50 minute class periods per week

**Course Coordinator:** James E. Richie

**Course Materials**:

**Required:** S. Haykin and M. Moher, Introduction to Analog and Digital Communications, 2nd Edition, New York, NY: John Wiley & Sons, 2007.

**Course Description:** Survey of digital and analog communication systems including signal representation, modulation techniques, transmit and receive network design considerations.

**Prerequisites**: ELEN 3020

**Selected Elective** in the "Electromagnetic Fields and Communication" and "Signals, Systems, and Control" areas, COEN Hardware area (depth only)

**Contribution to Professional Component**: Engineering Science 70%

Engineering Design 30%

**Course Goals:**

To obtain an understanding of current digital and analog communication systems, with emphasis on performance measures and their evaluation. Modulation techniques will be analyzed both on the basis of spectral characteristics and performance in random noise. Error Probability of digital systems will be evaluated, and their performance will be compared. Examples of practical systems will be discussed.

**Course Objectives:**

*By the end of this course, you should....*

1. Understand information rate, bandwidth and power, and their relationships for an acceptable signal transmission from a source to a sink.
2. Be able to model signals, noise, and the system performances using random process and linear system theory
3. Be able to define the various types of signal modulation, both qualitatively and quantitatively.
4. Understand various blocks of the transmitter and the receiver.
5. Understand the tradeoff between energy, bit error rate, signal bandwidth, design complexity, etc.

**Contribution to Program Objectives**: partial fulfillment of Criterion 3 objectives A, E, H, K

**Course Topics**

1. Course Overview
2. Amplitude Modulation (AM) -- Analog

3. Angle Modulation (FM and PM) -- Analog

4. Pulse Modulation -- Digital

5. Baseband Data Transmission -- Digital

6. Noise

a. Analog Noise

b. Digital Noise

c. System and Noise Calculations

Last modified: January 24, 2018