EE351-Introduction to Communication Engineering (Required Course)

Code and Name: EE351 Introduction to Communication Engineering
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Communication Systems, Simon Haykin and Michael Moher, Fifth Edition, WILEY, 2009.

Other References:
- R. E. Ziemer and W. H. Traner, Principles of Communications, 4th edition, Wiley, 1995 sadf
- Leon Couch, Digital and Analog Communication Systems, 6thedition, Prentice Hall, 2001
- Maurice Schiff, Introduction to Communication Systems Simulation, Artech House Mobile Communications Library, 2006
- Bruce Carlson, Paul Crilly and Paul B. Crilly, Communication Systems, McGraw-Hill , 5thed., 2009

Course Description:
Elements of a communication system. Transmission of signals through linear systems. Representation of baseband and band-pass signals and systems, Signal spectrum. Analog Amplitude Modulation and Demodulation (AM, DSBSC, SSB, VSB). Analog Angle Modulation and Demodulation (PM, FM). Noise representation and analysis: SNR analysis of AM and FM systems. Sampling theorem. QAM multiplexing. Pulse modulation techniques: PAM, PPM, PWM.

Pre-requisites: EE 232, EE 271 and Math 235
Co-requisites: None.

Course Learning Outcomes:
With relation to ABET Student Outcomes (SOs: 1-7)
1. Recognize the parameters, characteristic, and applications of Communication Systems. (1)
2. Recognize and state Amplitude Modulation techniques, Angle Modulation techniques. (1)
3. Recognize the general frequency response characteristics of different modulation systems. (1)
4. Explain the general frequency response characteristics of different modulation systems. (2)
5. Design basic Communication Systems, active filters and different types of receivers and transmitters for different communication techniques. (2)
6. Illustrate using new technologies: submitted in Word and Power point in preparing their reports. (3)

Topics to be covered:
- **Introduction:** Introduction to communications systems.
- **Representation of Signals and Systems:** The Fourier transform and its properties, Linear filters, Low-pass and Band-pass filters and systems.
- **Amplitude modulation:** Double-side band with suppressed/ large carrier modulation, Quadrature multiplexing, Single-side band and vestigial side band methods of modulation, Frequency translation, Frequency division multiplexing.
- **Angle modulation:** Frequency and phase modulation, Phase-locked loop, Nonlinear effects in FM systems, The super heterodyne receiver.
- **Probability theory and random processes (revision):** Random variables and random processes, Mean, Correlation and Covariance functions. Power spectral density, Noise, Narrowband noise.
- **Noise in Continuous-Wave modulation systems:** Receiver model, Noise in DSB-SC receivers, Noise in AM receivers, Noise in FM receivers, Pre-emphasis and De-emphasis.
- **Pulse modulation:** The sampling process, Pulse-amplitude modulation, Time-division multiplexing, Pulse-position modulation, Pulse width modulation.

Grading Policy:
The grading for the course are 60% coursework and 40% Final Exam. The coursework consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.