Course Title: Communication Systems and Noise
Course Code: ETEG 430
Credit Hours: 3

Course Description:
This course intends to make an extensive treatment of noise in both analog and digital communication systems

Course Contents:

Unit 1: Random Process and Noise
Random variable, Probability distribution function, probability density function, Average value, Gaussian Probability density, Error Function, Correlation between random variables, Random Process, Autocorrelation, power spectral density. Sources of noise, Frequency Domain Representation, Effect of filtering on characteristics of noise, Quadrature components of noise and their characteristics, irrelevant noise

Unit 2: Analysis of Digital Baseband Systems
Noise in PCM, noise in DM, ISI, Baseband pulse shaping (Nyquist's criterion I, II, III); Partial response signaling (Dobinary coding and decoding precoding, duobinary equivalent transfer function); Error probability of digital baseband transmission systems definition of error probability of bit and Error Rate (BER); Error probability for multilevel transmission

Unit 3: Noise in Communication System
Effect of noise on SSB-SC, DSB-SC, Envelop demodulator, noise in FM, Comparison of FM and AM in noise, Comparison of FM and PM in noise, Noise in PCM, Noise in DM

Unit 4: Signal Detection in Presence of Noise
Gram-Schmidt Orthogonalization, Geometric interpretation of signals, Response of band of correlators to noisy input, Maximum likelihood detector, matched filter receiver, Digital modulation techniques and their performance in noise: PSK, FSK, MSK

Unit 5: Noise Calculation in Communication System
Resistor noise, Network with reactive elements, Noise temperature, Noise bandwidth, Noise figure, Noise figure and equivalent noise temperature of a cascade, System calculation

Unit 6: Noise in Specific Communication Systems
A case study

References:
1. H. Taub and D.L. Schilling, *Principles of communication Systems,* Tata McGraw Hill 1986
2. B.P. Lathi, *Modern Analog and Digital Communication Systems,*Oxford University Press
3. M.S. Roden, *Analog and Digital Communications systems,* Prentice Hall

Evaluation:
In-Semester Evaluation: 50%
End-Semester Evaluation: 50%