

Course Title: Digital Communication

Course Code: ETEG 304

Credit Hours: 3

Course Description:

This course provides an understanding of the essentials of modern digital communications systems. This course builds on the material introduced in signal and systems and complements the course "Analog Communication"

Course Contents:

Unit 1: Data Transmission and Digital Modulation Techniques

Signal receivers and error probability, Optimum filters, the matched filter, coherent and non-coherent receivers, Binary phase shift keying (BPSK), Quadrature phase shift keying (QPSK) and M-ary PSK, frequency shift keying (FSK), Imperfect synchronization and error probability in PSK and FSK systems, quadrature amplitude shift keying (QASK), Other methods of digital modulation

Unit 2: Information Theory and Coding

Information content, Entropy, Information rate and coding, Shannon's theorem and channel capacity, parity bit coding for error detection and correction, Block codes, coding and decoding, Hamming distance, Examples of algebraic codes, Introduction to convolution coding and decoding

Unit3: Review of Sampling Theory

Pulse amplitude modulation (PAM) and bandwidth requirement, PAM natural and flat top sampling, signal recovery, Quantization and quantization error

Unit 4 : Pulse Code Modulation (PCM)

Encoders, Decoders and companders, Multiplexing and synchronizing, Differential PCM, Noise in PCM systems

Unit 5: Delta Modulation (DM)

Characteristic encoding methods, Adaptive DM and continuously variable DM, Sigma delta modulation, noise in DM systems

References:

1. H. Taub and D. L. Schilling, *Principles of Communications Systems*, 2nd Ed McGraw Hill 1986
2. B. P. Lathi, *Modern Analog and Digital Communication Systems*, 2nd Ed
3. M. S. Roden, *Analog and Digital Communications Systems*, 3rd Ed Prentice Hall
4. S. Haykin, *Digital Communications*, Wiley Eastern