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Department of Electrical Engineering	
Digital Communications (63471)	
Total Credits	**3**
major compulsory	
Prerequisites	P1 : Communication Principles (63375)

Course Contents

Pulse modulation: Sampling process. Pulse Modulation (PAM, PWM, PDM). Quantization process, pulse code modulation, noise considerations in PCM systems. Time division multiplexing, Digital multiplexers. Delta modulation. Differential pulse code modulation. Adaptive pulse code modulation. Linear Predictive Coding (introduction) Passband digital transmission: Passband transmission model. Coherent phase shift keying, M-ary phase shift keying (QPSK and M-ary PSK). Hybrid amplitude/Phase modulation schemes (QAM). Coherent Frequency shift keying. Non coherent orthogonal modulation. Non coherent binary FSK. Differential phase shift keying, M-ary FSK. Effect of noise on various modulation scheme and analysis for the computation of average probability of error versus increased bandwidth transmission. Baseband pulse transmission: Matched filter. Error rate due to noise. Intersymbol interference.

Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Convert signal from analog to digital and vice versa using sampling theory.	A	40 %
2	Analyze the effect of various noise types on the average probability of error	C	35 %
3	Prepare related research	I	25 %

Textbook and/ or Refrences

1. Communication Systems, Simon Haykin, Wiley, 2. Electronic Communication Systems, Wayne Tomasi 3. Digital Communications, Bernard Sklar, Prentice hall, 4. Modern Digital and Analog Communication Systems, B.P. Lathi, Oxford University Press, 5. Online Resources

Assessment Criteria	Percent (%)
First Exam	15 %
Second Exam	15 %
Projects	20 %
Final Exam	50 %

Course Plan

Week	Topic
1	Sampling theorem. Ideal sampling and aliasing.
2	Pulse amplitude modulation. Pulse duration modulation, Pulse position modulation (generation and demodulation)
3	Pulse code modulation. Delta modulation, slope overload and granular noise in delta modulation.
4	Time division multiplexing. Differential pulse code modulation, sigma delta modulation. Electrical representation of binary data.
5	Linear quantization, Linear Prediction (introduction)
6	Quantization noise
7	Midterm exam 1
8	Non linear quantization(mu-law ,A-law)
9	Digital modulation concept , Shannons theorem(capacity)
10	Binary amplitude shift keying ,frequency shift keying phase shift keying ,M array coding

11	BPSK, QPSK modulators/demodulators
12	8-PSK,16-PSK,QAM modulator/demodulators.
13	Project
14	Energy per bit, noise power density, Probability of error (BER)
15	Baseband Pulse Transmission (ISI,)
16	Final Exam