

Wireless Digital Communication

- 1.1 Course Number: CS481
- 1.2 Contact Hours: 3-0-0 Credits: 9
- 1.3 Semester-offered: 4th Year-Odd
- 1.4 Prerequisite: Basic Electronics Engineering, Analog Electronics, Analog Communication systems.
- 1.5 Syllabus Committee Member: Dr. Sushum Biswas, Dr. Daya Sagar Gupta & Dr. Gargi Srivastava
2. **Objective:** This course provides the information about the baseband and passband transmission schemes, enabling the student to determine errors, study different keying techniques, and also know about information theory and channel coding.
3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Sampling process and waveform coding	Basic elements of a digital communication system- Sampling Theorem - Sampling and signal recovery -PAM, PCM -Channel noise and error- Quantization Noise-SNR -TDM -DM- ADMLinear prediction, - DPCM	8
2	Baseband Pulse Transmission	Discrete PAM signals - Matched filter - Intersymbol Interference- Nyquist's criterion for Distortion less Transmission- Correlative coding –Baseband M-ary PAM systems -Adaptive Equalization-Eye patterns	8
3	Pass band transmission	Gram-Schmidt Orthogonalization Procedure; Geometric Interpretation of Signals; Correlation Receiver- Introduction to digital modulation schemes- Generation, Detection, BW,PSD of ASK, FSK, PSK, DPSK, QPSK, Comparison of digital modulation systems - Carrier and symbol synchronization.	8
4	Error Control Coding	Channel coding theorem -Linear block codes - Cyclic codes –Convolutional codes - Maximum likelihood decoding - Viterbi Algorithm- Trellis coded modulation.	8
5	Wireless Channel Models	Basic cellular concepts- propagation effects-Fading- Channel models- statistical characterization of multipath channels, Delay spread and Doppler spread, classification of multipath channels. Diversity techniques.	8
		Total	40

4. Readings

4.1 Textbook:

- Simon Haykins, "Communication Systems", John Wiley, 4th Edit

4.2 Reference books:

- Sam K. Shanmugam "Analog & Digital Communication" John Wiley.
- John G. Proakis, "Digital Communication" McGraw Hill 3rd Edition, 1995
- Dr J.S Chithode, " Analog and Digital communication" Technical publicarion, 3rd Edition 2012.
- Taub & Schilling , "Principles of Digital Communication " Tata McGraw-Hill" 28th reprint, 2003

5 **Outcome of the Course:** After the completion of this course, the students will be able to:

- Explain the concept of sampling and various waveform coding schemes.
- Apply the baseband transmission techniques using Nyquist criterion
- Identify the performance features of various data transmission schemes in pass band transmission
- Compute the original transmitted code words after the noise introduction in the transmission path
- Explain the concept of channel modeling and fading in wireless communication.