

# NOC: Error control coding: An introduction to linear block code - Video course

## COURSE OUTLINE

Error control coding is an indispensable part of any digital communication system. In this introductory course, we will discuss theory of linear block codes, their encoding and decoding techniques as well as their applications in real world scenarios. Starting from simple repetition codes, we will discuss among other codes capacity approaching low density parity check codes. We will also discuss bounds on number of codewords given codeword length and minimum distance of code.

## COURSE DETAIL

Week .No	Topic
1	Lecture 1: Introduction to error control coding Lecture 2: Introduction to linear block codes, generator matrix and parity check matrix Lecture 3: Properties of linear block codes: syndrome, error detection, error correction
2	Lecture 4: Decoding of convolutional codes-I: Viterbi algorithm Lecture 5: Decoding of convolutional codes-II: BCJR algorithm
3	Lecture 6: Some simple linear block codes: Repetition codes, Single parity check codes, Hamming codes, Reed Muller codes Lecture 7: Bounds on size of codes: Hamming bound, Singleton bound, Plotkin bound, Gilbert-Varshamov bound
4	Lecture 8: Low density parity check codes Lecture 9: Decoding of low density parity check codes: Belief propagation algorithm Lecture 10: Applications of linear block codes

## References:

1. "Error Control Coding", by Shu Lin and Daniel J. Costello, Jr., second edition, Prentice Hall, 2004.
2. F. J. MacWilliams, N. J. A. Sloane, "The Theory of Error-Correcting Codes", North-Holland, Amsterdam, 1977
3. R. E. Blahut, "Algebraic Codes for Data Transmission", 1st Edition, Cambridge University Press 2003.
4. Todd K. Moon, "Error Correction Coding", 1st Edition, Wiley-Interscience, 2006.
5. Cary W. Huffman, Vera Pless, "Fundamentals of Error-Correcting Codes", 1st Edition, Cambridge University Press, 2003.



NP-TEL

# NPTEL

<http://nptel.ac.in>

## Electronics & Communication Engineering

### Pre-requisites:

Basic knowledge of probability theory and digital communications

### Coordinators:

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