

## Course Objectives:

- To learn how codes in mathematics are used for error correction and data transmission.
- To comprehend the algebraic structure of linear codes viewed as a vector space over a finite field.

**UNIT – I**

**Linear Code:** Introduction - Linear codes, Encoding, Decoding - Check Matrices and Dual Code

**UNIT II**

**Linear Code continued:** Classification by Isometry – Semilinear Isometry Classes of Linear codes – The Weight Enumerator

**UNIT III**

**Bounds and Modifications:** Combinatorial Bounds for the Parameters - New Codes from Old and Minimum distance – Further Modifications and Constructions.

**UNIT IV**

Reed Muller Codes – MDS Codes

**UNIT V**

**Cyclic Codes:** Cyclic Codes as Group Algebra Codes – Polynomial Representation of Cyclic Codes – BCH Codes and Reed-Solomon Codes

**TEXT BOOK**

- [1] Anton Betten, Michael Braun, Harald Friepertinger, Adalbert Kerber, Axel Kohnert and Alfred Wassermann, Error-Correcting Linear Codes, Classification by Isometry and Applications, Springer-Verlag Berlin Heidelberg 2006.

UNIT I	Chapter 1 (Section 1.1 – 1.3)
UNIT II	Chapter 1 (Section 1.4 – 1.6)
UNIT III	Chapter 2 (Section 2.1 – 2.3)
UNIT IV	Chapter 2 (Section 2.4 & 2.5)
UNIT V	Chapter 4 (Section 4.1 – 4.3)

**REFERENCE(S)**

1. F. J Mac Williams and N. J. A. Sloane, The Theory of Error-Correcting Codes, North Holland Publishing Company 1977.
2. D.G. Hoffman et al, Coding Theory: The Essentials, Marcel Dekker, Inc, 1991
3. S. Ling and C. Xing, Coding Theory : A first course, Cambridge University press, 2004.