

# MTH351 Coding Theory

**Level:** 3

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY JULY

## **Synopsis:**

MTH351 Coding Theory introduces students to mathematics behind successful transmission of data through a noisy channel and correcting errors in corrupted messages. The topics covered are of central importance for many applications in computer science and engineering. The course gives a comprehensive introduction to coding theory whilst only assuming basic linear algebra. The issues of bounds and decoding essential to the design of good codes will be featured prominently.

## **Topics:**

- Groups
- Cosets
- Polynomial Rings
- Fields
- Finite Fields
- Linear Codes
- Hamming Distances and Hamming Codes
- Cyclic Codes
- BCH Codes
- Reed-Solomon Codes
- Goppa Codes
- Turbo Codes

## **Textbooks:**

San Ling & Chaoping Xing,: Coding Theory A First Course 2004 Cambridge University Press  
ISBN-13: 9780521529235

San Ling & Chaoping Xing,: Coding Theory A First Course 2004 Cambridge University Press  
ISBN-13: 9780521529235-AA

**Learning Outcome:**

- Show the existence/non-existence of certain codes with certain parameters.
- Demonstrate the decoding of BCH codes, Reed-Solomon codes and Quadratic-residue codes.
- Calculate generator matrix and parity-check matrix of a given linear code.
- Construct certain linear codes from other given linear code.
- Determine the generator polynomial of a given cyclic code.
- Compute the capacity of a discrete memoryless communications channel.

**Assessment Strategies:**

<b>Continuous Assessment Component</b>	<b>Weightage (%)</b>
COMPUTER MARKED ASSIGNMENT	10
COMPUTER MARKED ASSIGNMENT	10
COMPUTER MARKED ASSIGNMENT	10
<b>Sub-Total</b>	<b>30</b>

<b>Examinable Component</b>	<b>Weightage (%)</b>
Written Exam	70
<b>Sub-Total</b>	<b>70</b>

**Weightage Total** **100**