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

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 - Regular Semester (Evening Class):

Components	**Description**	**Weightage Allocation (%)**
Overall Continuous Assessment	COMPUTER MARKED ASSIGNMENT 1	10
	TUTOR-MARKED ASSIGNMENT 1	20
Overall Examinable Components	Written Exam	70
Total		**100**

*The information listed is subject to review and change.