

**CIE 425 Information Theory and Coding Project (Part 2)**

**Software**: MATLAB, or any other suitable programming language

**Requirements**:

1. Design a rate 1/3 convolutional encoder with constraint length K = 3. You are free to choose the generator polynomials the way you wish.
2. Develop software code that implements the convolutional encoder without using built in functions in MATLAB
3. In the encoding process, you are required to divide your block of bits into smaller blocks and encode each one individually. The same will be done at the decoder. After each block, you are required to add a specific number of zeros to ensure that the encoder state returns back to the all zeros state.
4. Add AWGN noise to the transmitted data
5. Implement the hard decision Viterbi decoder using your own developed MATLAB code. You can assume simple BPSK mapping with a hard decision demapper.
6. Plot the BER versus SNR curve when using the convolutional code, versus without coding.
7. You are required to integrate Part 2 of the project with Part 1 (JPEG coding) and have an end-to-end running communication system. The received image after adding noise, error correction, and JPEG decoding should be compared with the transmitted image indicating the errors that occurred in the received image for 3 different SNR values, with and without channel coding.

**Overall Project Grading:**

Whole project: 20% from final grade

Part 1 (JPEG): 8%

**Part 2 (Convolutional Encoding and Decoding): 7%**

Presentation and discussion: 5%

**In part 2 the 7% of the final grade will be distributed over 100 marks as shown below. The grading below includes the code and its documentation (no code should be submitted without proper documentation).**

* 20: Convolutional encoder
* 60: Viterbi decoder
* 10: BER versus SNR calculation
* 10: Integration with Part 1

**Discussion (5% of the final grade, distributed over 100 marks):**

* Will be on both parts 1 and 2 in week 15.