**Digital Communication Systems Laboratory**

**Fall 2021**

**Laboratory 03: Binary Baseband Coding**

**Laboratory Goals:**

* What does baseband and passband mean?
* What is a binary coding?
* What are symbol rate and bit rate?
* What are the cons and pros of a binary coding?

**Description:**

In this experiment, we study the binary coding techniques in the baseband. Most of the laboratory content can be found in the MATLAB live script. This document gives a brief description about every section, then states the laboratory tasks.

1. Parameter initialization.
2. Definition of baseband, passband, symbol set, and binary coding.
3. Generation of random binary sequences and visualizing them after sampling.
4. Description, generation and visualization of binary coding techniques.
5. Definition of bandwidth, null bandwidth, and comparison of binary coding techniques based on bandwidth.

**Tasks:**

1. Use these parameters for all the following tasks:
   1. Amplitude (): TUID(9) + 1 Volt
   2. Frequency (): TUID(8) + 1 KHz
2. Use two of the following waveforms based on your TUID(7) and plot corresponding binary encodings. 6

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TUID(7) | 0, 1 | 2, 3 | 4, 5 | 6, 7 | 8, 9 |
| Encoding 1 | Bipolar RZ | Unipolar NRZ | Bipolar NRZ | Bipolar RZ | Unipolar RZ |
| Encoding 2 | Manchester | Differential RZ | Differential RZ | Differential NRZ | Manchester |

1. Fill the following table by the assigned waveforms of Task 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Symbol Rate | Bit Rate | BW | Null BW |
| Encoding 1 |  |  |  |  |
| Encoding 2 |  | 2\*RZ |  |  |

1. Plot the spectrum of two encodings in dBW.