**ECE 3512: SignalS – Continuous and Discrete**

# Recitation No. 8: Sampling

In this recitation, we will explore the process of sampling and reconstruction of a signal. We are going to consider three signals:

1. 
2. A pulse train with a fundamental frequency of 250 Hz and a duty cycle of 25%.
3. Record your own voice as you speak the phrase “EE 3512 is my favorite course. It is so interesting and I am learning so much.”

The tasks to be accomplished in this lab are:

1. For the first two signals, sketch the spectrum of the sampled signal that results when you sample these signals at 4000 Hz and 8000 Hz. You can use whatever set of tools you need to accomplish this task as long as your work is original.
2. A signal can be reconstructed from its sampled version using the following interpolation formula:



Assume , where B is the bandwidth of the signal. Set fs = 8000 Hz.

Plot the reconstructed signal for the cases L = 2, 4, 8, 128 for signals (1) and (3). Do this by setting  and iterate over the entire duration of your voice recording in (3).

Compute the RMS of the difference between the reconstructed and the original signal. Show that the RMS decreases as L increases. Why?

Play the reconstructed signals through your audio system on your laptop and describe what you hear.

Hint: To understand problem 2, you need to understand the picture below:

