3.1 Lab 3A: OFDM Simulation with Synchronized Clocks

Timing synchronization is the process by which a receiver aligns the points it captures to the corresponding transmitter. Carrier synchronization is the process by which the receiver aligns the frequency and phase of its oscillator with the received signal. The synchronized clocks assumption simplifies implementation significantly. We don't have to account for any frequency or phase offsets of the signal. This still means that we need to account for any delay between transmitter and receiver in our simulation.

Goal: Implement a timing synchronized OFDM simulation.

1. Generate a vector of OFDM modulated data samples (including training samples).
2. Send the vector across a timing synchronized simulated channel.
3. Decode the received signal.
4. Recover the transmitted bits.

You are provided a MATLAB function, nonflat_channel, that simulates a timing synchronized channel.

Deliverables: Please turn in your MATLAB implementation of the simulated system and a report. Make sure to refer to the technical writing expectations for this course in the appendix as you write your report.

Table 3.1: Lab 3A Rubric

	Points	Self-Assessment
Introduction Section *Introduction of the goal of the lab and any contextual information*	5 points	
System Explanation *Explanation of the physical system; Diagrams are well suited to this*	5 points	
Explanation of OFDM *Explanation of OFDM written in a way such that a high schooler could follow*	20 points	
Explanation of the Fourier Transform, IDFT, and DFT *Explanation of surrounding concepts integral to OFDM and how they are important to this particular algorithm*	20 points	
Implementation Section *Discussion of your particular implementation that highlights any design decisions*	15 points	
Code Explanation *Explanation of your code that isn't super granular; Include a flow diagram*	10 points	
Results Section *An overview of the results of your implementation; Include all plots that illustrate your implementation* *Include:* *- Constellation diagrams of relevant signals* *- One block of sent and received data* *- BER*	10 points	
Technical Writing *Refer to the technical writing guidelines*	10 points	
Self-Assessment *Fill out this rubric and include it in your submission.*	5 points	