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CS5001 – Senior Design Project
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Assignment 3 – Individual Essay

From my perspective, our software is an exercise in algorithm and UI design. The core functionality of the program—optimizing marching band routines—requires us to write an algorithm that can determine an optimal marching pattern. Ideally, there will be a way to do it programmatically, but it's possible that we'll need to introduce some machine learning concepts. The first step in my opinion, however, is to define what makes a routine optimal. We need to be able to quantify this, then we can start worry about the how. As our application will also have some kind of GUI, UI design will also play a huge role in development. GUI design is perhaps less interesting from an academic perspective, but it's nonetheless important to any program you expect people to use nowadays.

The three courses I think will be most relevant to our success with this project are CS2028C (Data Structures), CS4071 (Design & Analysis of Algorithms), and CS4033 (Artificial Intelligence: Principles & Applications). All three of these courses focus on understanding how algorithms work and the various ways in which they are written. As mentioned in the previous paragraph, I believe this to be the primary task we must overcome in building our application. CS4071 in particular will be invaluable in my opinion. I still have my textbook from that class because I find it to be genuinely helpful in learning how to classify algorithms. My time in CS2028C will also help me with this project. My professor in that course did an excellent job teaching us how to think about solving problems by defining the expected inputs and outputs.

I spent all five of my COOP semesters as a junior engineer at Etegent Technologies ltd. While working there, I became intimately familiar with more practical applications of programming. In particular, I learned how to properly use version control systems like Git and Subversion and how to write code as a part of a team. I also learned a great deal of non-technical skills that will be helpful for this project. Most notably, my communication skills improved dramatically. Learning to prepare for and participate in our weekly meetings has helped me improve my ability to contribute to a team. I suspect this will be just as critical for our senior design project.

My motivation for this project is entirely based on the algorithm development work. Two of the four members of our group are band members, and I am not one of them. I have no allegiance towards the band, and barely understand why they are insisting this is necessary, but I love designing algorithms for problems like this. During one of my COOP semesters, I spent nearly a week designing an algorithm that would determine how much to randomly sample from a set of populations of different sizes such that the confidence in the sample size from each population was the same. That task was incredibly enjoyable for me. That is why I'm excited for this project.

In terms of where to start, I already briefly mentioned it in the intro, but I think defining what makes a band routine optimal is the logical first step. The two team members more familiar with the ins-and-outs of the band will be instrumental—pun intended—in this stage. At that point, it's off to the races. In my opinion, we'll have done a good job if by the end of the whole process, we have an application with a proper frontend that can complete a proper demo. If we can reach that stage, we'll have succeeded. In

terms of personal contributions, I think we can assume that everyone makes equal contributions with proper task assigning and frequent commits.