Cbb752b22 Quiz #2 Study Guide

There are **some topics** in lecture that we **drilled down** into detail on. Here is a list of those topics that you should know in detail for the quiz:

- How to calculate a gradient for deep-learning given a loss function or an activation function?
- Concepts of supervised, unsupervised, and reinforcement learning, with examples. In particular, what is reinforcement learning and how does it compare to supervised and unsupervised learning?
- Methods of data augmentation
- The difference between discriminative & generative models, with examples
- Architecture of convolutional and recurrent neural networks, and how their design serves the purpose (you do not need to know the computational details).
- How to calculate convolution (with stride/padding). How to do max pooling
- The problem of exploding/vanishing gradient and ways to solve it
- What are the forces between atoms in a macromolecule? What is the origin of the hydrophobic "force/effect"?
- What atoms are Phi/Psi dihedral angles defined by? What is a Ramachandran plot and where are the major regions (a-helix/beta sheet)?
- How to calculate the number of degrees of freedom? Specifically, how to enumerate variable bond angles and bond lengths, given the length of a protein?
- Common features of intrinsically disordered proteins
- How do you calculate packing fraction? And how does roughness, aspect ratio (for ellipsoids), and order affect packing fraction?

For **all other topics**, you should understand at a **high level,** i.e., the contents of the lecture. Quiz #1 will cover everything from the 2nd half of class, including the two TF lectures and biosensor analysis (from 3/9 to 4/22)

You can find all slides on the class website: http://cbb752b22.gersteinlab.org/syllabus, and all recorded lectures on canvas->media library.

Examples of previous quizzes may also be helpful to get an idea of what may be on this year's: http://cbb752b22.gersteinlab.org/quiz