Cbb752b23 Quiz #2 Study Guide

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

- Network quantities (clustering coefficient & path length)
- Models for interpreting network topology
- Definitions of data privacy and security, the balance between privacy vs utility
- Challenges arising in biosensor analysis and how to solve them
- Concepts of supervised, unsupervised, and reinforcement learning
- How to calculate a gradient for deep learning given a loss function or an activation function (understand backpropagation)
- The architecture of CNN, how to calculate convolution (with stride/padding) , how to do max pooling
- Understand the basic idea of RNN, and how its design serves the purpose (you do not need to know the computational details).
- The problem of exploding/vanishing gradient and ways to solve it .
- Understand the general idea of the architectures of Autoencoder and VAE.
- What are the forces between atoms in a macromolecule? What is the origin of the hydrophobic "force/effect"?
- How to calculate the number of degrees of freedom for a protein. Specifically, how to enumerate variable bond angles and bond lengths, given the length of a protein.
- Common features of intrinsically disordered proteins
- Understand why it is important to study protein cores
- How you might find differences between x-ray and NMR protein structures
- What atoms are Phi/Psi dihedral angle side chain angles defined by? What is a Ramachandran plot and where are the major regions (a-helix/beta sheet)?
- Understand why protein cores have smaller packing fraction than the densest packing fraction for hard spheres

For all other topics, you should understand at a high level, i.e., the contents of the lecture. Quiz #2 will cover everything from the 2nd half of class, including the four TF lectures(from 3/1 to 4/19)

You can find all slides on the class website:http://cbb752b23.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://cbb752b23.gersteinlab.org/quiz