



6. (4pts) Given the following RNA sequence, what is the corresponding amino acid sequence generated after translation? Use the three letter abbreviations for amino acid name (if you need a codon table, visit the Web site).

5' -AUGUUUGUCCAACACGAGGUUUUAUUGCGAAGCC-3'

7. (4pts) In sickle cell anemia, a mutation causes the RNA sequence for a particular protein to be altered from GAG to GUG.

a) What does this mutation do to the amino acid sequence?

b) What does this imply for the protein structure?

8. (6pts) Draw a section of a eukaryotic cell membrane, showing the following structures and a short description of their function:

a) phospholipid bilayer

b) receptor protein

c) channel protein

d) cholesterol

e) sodium/potassium pump

9. (4pts) Give an example for each of the following (drawings count):

a) protein primary structure

b) protein secondary structure

c) protein tertiary structure

d) protein quaternary structure

10. (4pts) Does DNA sequence uniquely determine a protein's structure? Why or why not?

11. (6pts) Visit the Protein Data Bank at <http://www.rcsb.org/pdb/> and find the entry for Deoxy Human Hemoglobin (PDB ID 1A3N).

a) How many residues long is this protein?

b) How many chains (and of what type) does it contain?

c) View the 3-dimensional structure using the QuickPDB option (last on the list of Interactive 3D Display options on View Structure page). Identify the arginine residues on chains A and C. Where are they located, especially in relation to each other?

d) In the context of hemoglobin, what is cooperative binding? What small molecule is cooperatively bound?

12. (2pts) Are there any combinations of phi/psi angles which are impossible? Why?