

Exam 09.04.2020. Biophysical chemistry CHEM-E3150.

READ THIS FIRST:

The first row of the answer document must contain your name, your student number, and today's date.

Answer all questions. Pay attention to writing your answers in a clear way with a logical structuring. The answer must be written on a computer, not handwritten on a paper. You can include pictures drawn by hand or by a graphics program, by for example taking a picture and inserting into the text in the appropriate position. The answers must be given in the right order and returned as one pdf-file. Writing the answer in for example word is sufficient, there is no official template.

Dear Student. These questions require some thinking. I want you to demonstrate understanding using your own words. For example, copying text direct from other sources will not give you very good grades. I also want you to use the approach used in our course. If you bring up other ways of looking at the problem, you are welcome to do so, but then you must explain how these relate to the approach that we took in the course. The pure listing of facts is not sufficient in an answer. Your reflections on their meaning will be the major basis of the evaluation.

You are free to use lecture notes for obtaining formulas if needed.

1. Protein folding can be difficult to predict. Discuss methods using homologous protein sequences to understand the principles of protein folding.
2. How should we understand the biological relevance of the absolute value of a K_D for the interaction of two biological molecules. How should we think about comparing K_D values between two different interactions in a biological context? Give examples.
3. In the course we have examined a way to understand protein folding from the formula $S = k_B \cdot \ln(W)$, and the formula $\Delta G = \Delta H - T\Delta S$. Explain how the reasoning goes.
4. There is a formula describing diffusion as follows: $(RMSD)^2 = 6D \cdot t$. Discuss how this formula should be understood for describing how a biological signal molecule moves in a media as a result of diffusion. How much is the signal molecule actually moving and where?
5. Temperature is an easily measured unit. It can be understood from the more fundamental unit of entropy. How does the concept of entropy lead to understanding temperature?