

CHEM 660 - Study Guide for Final Exam

Protein-Protein and Protein-Ligand Interactions:

Need to be generally familiar with material covered in lecture

1. General properties of ligand binding
2. Binding affinities (K_a vs K_d) – know the relationship and be able to calculate, also determine for ligands that bind competitively
3. Relative affinities and cooperativity as it relates to ligand binding
4. Rates of binding and dissociation (k_a and k_d) and how they relate to binding affinities.
5. Protein conformation and binding-

Need to be familiar with material in items 1-5

6. Generally familiar with antibodies and their function and properties
7. More detailed knowledge of DNA-binding proteins
8. Be familiar with interactions between proteins and very small ligands (what metal ions and what kind of functions they can serve.)
9. Need to be familiar with interactions in proteins with multiple binding sites and allostery (with hemoglobin as a model). This resurfaces in discussions with enzyme regulation.

Enzyme Catalysis:

Need to be generally familiar with material covered in lecture

1. Need to know what enzymes are and general properties such as kinetics of enzyme action.
2. Michaelis-Menten equation (know how it relates to parameters associated with enzyme catalysis)... be able to use and solve for parameters.
3. What are Lineweaver-Burk plots
4. Be familiar with steady state kinetics and initial velocity and associated assumptions.
5. What about when multiple substrates are involved?
6. Be familiar with catalytic strategies and their contributions.
7. What are coenzymes and cofactors and what roles do they play, general familiarity and knowledge of some examples.
8. What is induced fit?
9. Be familiar with various inhibition mechanisms, their impact on enzyme catalysis and considerations for each of them.
10. Be familiar with serine proteases –mechanism and substrate specificities
11. Be familiar with tRNA synthetases (including material from paper)
12. Be familiar with allosteric regulation of enzymes (related to material covered in lecture on protein-ligand interactions. Be familiar with ATCase example.

Be familiar with the assigned human-growth hormone paper.

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Protein Biosynthesis:

Need to be generally familiar with material covered in lecture

1. DNA → RNA → Protein (generally familiar with how we get from DNA to proteins... with more detailed familiarity with ribosomes and translation)
2. What is topogenesis?
3. Translation and targeting proteins to the ER... need to be familiar with process and signals.
4. Folding auxiliary proteins and their roles (esp. GroEL/GroES)
5. Be familiar with sorting in ER, Golgi and destinations (don't worry about chloroplasts).
6. What about proteins bound for the nucleus?
7. Need to be generally familiar with membrane protein biosynthesis
8. Be familiar with posttranslational modifications, broad overview as well as details... examples.
 - a. Proteolytic processing
 - b. Modification of termini
 - c. Glycosylation
 - d. Phosphorylation
 - e. Disulfide formation
 - f. Methylation and side-chain acetylation
9. Protein degradation
 - a. Why is it necessary
 - b. Role of proteases
 - c. Lysosomes
 - d. Ubiquitination (including process/mechanism) and proteasome (function and some mechanistic info.)

Proteomics:

1. General familiarity with Miller-Urey experiment and significance.
2. Terminology: Homology
3. Sequence homology and what it can tell us about evolutionary relationships.
4. Structural similarity in the absence of sequence homology.
5. Do all genes change at the same rates with evolution?