Study Guide for Second Exam

Chapter 5

The structures of the twenty amino acids that are used to make proteins are important, and need to be memorized.
The three and one letter abbreviations for amino acids are commonly used. The three letter abbreviations should be memorized.
The approximate pKs of the ionizable side chains of amino acids are important, and need to be memorized.
The peptide bond has extensive double bond character, which influences the three dimensional structure of proteins.
The primary sequence of a protein is unique to each protein.
The primary sequence of a protein determines its three dimensional shape.
The primary sequence of a protein is determined by its gene in the DNA.
Genes are read in three base units called codons.
Proteins can be processed after their synthesis (post translational processing).
Proteins can be purified by centrifugation and/or chromatography.
Protein sequences can be determined enzymatically, chemically, or using mass spectroscopy.
Peptides can be synthesized by solid phase synthetic techniques.

Chapter 6

Proteins fold into three dimensional structures.
Structural characterization of proteins occurs at four levels: primary, secondary, tertiary, and quaternary.
Due to the size of amino acid side chains, only a limited number of bond angles are allowed in proteins. These are described in a Ramachandran plot.
Regular secondary structures include alpha helices, beta sheets, and beta turns.
Super secondary structures are regular combinations of secondary structures.
Tertiary structures include domains, which are structurally and functionally distinct regions of proteins.
Proteins can fold and unfold into and from functional conformations.
Quaternary structure requires multiple polypeptide chains.
The prediction of proteins structures from primary sequence is still being developed.
Protein structures can be studied spectroscopically, by NMR, and by crystallography.
Protein molecular weights can be estimated chromatographically, or determined exactly by mass spectrometry.

Chapter 7

Hemoglobin and myoglobin are oxygen binding proteins.
Oxygen binds to a ferrous ion in the middle of a heme.
Oxygen binding can be characterized mathematically to both hemoglobin and myoglobin.
The Hill equation is used to characterize cooperative ligand binding to proteins.
Binding cooperativity is associated with allosteric transitions in proteins. Oxygen binding to hemoglobin is influenced by environmental factors (the Bohr effect). A protein mutation occurs at the DNA level, where a nucleotide is substituted, added, or removed from a gene. Mutations can have varied effects, from no effect at all to the death of the organism. Immunoglobulins are proteins with varied amino acid sequences used to combat infections. Immunological methods are important biochemical tools.