

# Review Summary – CH370 - Exam 1

## Amino Acids and Peptides

Know all 20 common amino acids – name / 3-letter abbrev. / 1-letter abbrev.  
Know approximate pKa's of titratable amino acids ( 2 / 4 / 6 / 8 / 10 / 12)  
Charge properties of amino acids and peptides / pI  
Nature of the peptide bond (phi / psi angles)

## Protein Structure

Definitions of primary, secondary, tertiary and quaternary structures  
Common secondary structures / Phi, Psi (  $\phi$  /  $\psi$  ) torsion angles  
How to read a Ramachandran Plot  
Common terms used to describe protein structure – motifs / domains - examples

## Protein Folding

Non-covalent Interactions  
Protein Folding – chaperones / models  
- thermo and approaches to predicting protein folds  
- use of energy potentials and simulations  
Denaturation / Renaturation – thermo and practice

## Review of Nucleic Acids: Structures / Folding

Know N Bases; Primary & Secondary structure: double helix by Watson & Crick -1953  
Nucleotide pairings: Watson-Crick  
Conformations of nucleosides - syn / anti; Sugar pucker: endo or exo  
Stabilization (destabilization) Hydrogen Bonding / Electrostatics / Stacking  
Denatured DNA: Heat denaturation of DNA is called "melting,"  $T_m$  / *hypochromism*.  
DNA Sequencing – Maxam-Gilbert vs. Sanger - basics; how to read a sequencing gel  
- Key features of NexGen Sequencing (*illumina* vs. *pyro 454*)  
DNA microarrays – general principles of gene-expression profiling (red / green / yellow)

## Bioinformatics and Software

Major web resource sites – NCBI / EMBL / ExPASy / PDB  
BLAST – principles, uses and definitions of **key terms**,  
Substitution matrices  
Sequence alignments / Scoring

## Protein Expression and Purification

### Produce / Extract / Purify

Produce: rich tissue / expression system  
Cloning: review steps involved  
Extract: cell lysis – grinding / sonication / French Press / detergent  
Purify: Take advantages of differences in:

### **Solubility / Charge / Size / Specificity / Hydrophobicity / Thermal Stability**

- various forms of chromatography (GF / IEC / HIC / AC (IMAC))

**Analysis:** Follow purification using an **assay** for “activity” and SDS gels