

Chemistry

- pH – How pH can affect the charge on molecules
- Chirality – how to determine and how it may affect drug properties

Molecular interactions:

- Electrostatic (charge-charge)
- van der Waals
- Hydrogen bonds

Hydrophobic effect:

- Entropy of water
- Role in protein folding and membrane assembly

Protein stability:

- **Importance of the following in stabilizing proteins**
 - van der Waals
 - H-bonds
 - Hydrophobic effect
 - Disorder of the chain
- How might mutations affect the stability of a protein

Ligand Binding

- Stabilizing interactions (charges, van der Waals, H-bonds, hydrophobic effect)
- Binding curves, K_D as 1/2 way point in binding, $\frac{1}{2}$ sites occupied.
- Lower K_D higher affinity, tighter binding

Enzymes

- Rate increase by stabilization of the transition state
- Active site:
 - Residues that bind specific substrates
 - Residues that are responsible for chemical reactions

Diseases due to inactive enzymes in metabolic pathways

- Build-up of intermediates prior to the step – often toxic

Carbohydrates

- Lactose and lactose intolerance
- Glycogen, structure and biological function

DNA

- Overall structure
 - Double stranded
 - Anti-parallel
 - Basepairing: A-T, G-C
- Translation from DNA to protein sequence – use of codon table (provided)

PCR

- Overall process
- How to select primer sequences
- How to use to detect viruses
- How to use to distinguish individuals