

Biochemistry Study Guide

1. **Know the difference between Hydrogen & Covalent Bonds**
2. **Be able to differentiate between polar and non-polar molecules.**
3. **Know what isomers & isotopes are**
4. **Recognize the structures/functions of biochemical functional groups (*amine, hydroxyl, etc*) AND the 4 macromolecules (Carbs, Lipids, Proteins, Nucl Acids).**
5. **Recognize and state the characteristics of dehydration, oxidation, reduction, and hydrolysis reactions in biochemical molecules.**
6. **Explain how enzymes catalyze reactions via the Induced Fit Model**
7. **Explain the impact pH, Temperature and concentrations have on enzyme activity.**

Metabolism Study Guide

1. **Show how Glucose is broken down to form ATP in cellular respiration, name the reactions, and where the various steps occur.**
2. **Explain how cellular respiration proceeds in the absence of oxygen.**
3. **List the structures involved in photosynthesis and how chlorophyll contributes to the process.**
4. **Explain where the different stages (*dark & light reactions*) of photosynthesis occur and what happens in each reaction to turn CO₂ into Glucose.**
5. **Explain the different methods of photosynthesis (C₃, C₄, CAM), and the advantages/disadvantages to each.**
6. **Know the role of enzymes in biochemical reactions (*eg. RUBISCO*) and how they catalyze chemical reactions.**

Homeostasis Study Guide

1. **Explain, with examples, the difference between negative and positive feedback and how they can maintain homeostasis.**
2. **Explain how different hormones can affect reproduction, growth, metabolism, response to stress and blood sugar levels.**
3. **Know the different parts of a neuron and the functions of each.**
4. **Describe how signals are transmitted through the nervous systems (action potentials, neurotransmitters, etc).**
5. **Know how the brain is organized into different regions with different responsibilities.**
6. **Explain how the parts of the kidney helps maintain water and salt balance in the body and leads to the formation of urine.**
7. **State the differences between endotherms and ectotherms and how their body temperatures affect their lifestyles.**

Molecular Genetics Study Guide

1. Know the structure of DNA, how the different subunits piece together, and how the double helix is held together.
2. Be able to identify the major people and their contributions involved in the discovery, importance, and structure of DNA (*Watson/Crick; Hershey/Chase, etc*)
3. Outline the steps in DNA Replication using proper terms (*leading/lagging strand, DNA Helicase/Polymerase, RNA primers, ssbp's, Okazaki Fragments, etc*).
4. Describe the link between DNA, RNA, and proteins.
5. Know the "Central Dogma" and how an mRNA sequence is converted to proteins.
6. Explain the steps (with enzymes) that lead from a piece of DNA becoming a protein (Protein Synthesis) AND be able to take a strand of DNA and get an amino acid sequence from it.
7. ~~Explain how genes may be regulated such as the lac operon model.~~
8. Be able to explain how different mutations can alter the amino acid sequence of a protein.

Cells & Cell Transport Study Guide

1. Know the basic characteristics of prokaryotic & eukaryotic cells AND differentiate between plant and animal cells.
2. Be able to explain the function of major organelles such as: mitochondria, chloroplasts, ribosomes, ER, Golgi Apparatus, Lysosomes, etc.
3. Explain the FLUID MOSAIC MODEL of the Cell Membrane, and the role different substances play in its function.
4. Describe the movement of substances along a concentration gradient.
5. Be able to explain how water moves across a membrane through osmosis.
6. Define & apply terms such as isotonic, hypertonic and hypotonic.
7. Explain how Active Transport, Coupled Transport and Endo-/Exo-cytosis move substances across a membrane.