**Unit 2 Map (Biochemistry: The Molecules that Support Living Organisms)**

AP Biology

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| **Topic** | **Objective** (with College Board Essential Knowledge’s in Parentheses) | **Specific Learning Target** | **Where did I learn this?**  (What resources should I use to study?) | **How well do I know this?**  (scale of 1 to 3, with 3 indicating a high level of understanding) |
| Atomic and Molecular Structure | 1. You will be able to describe the basic structure of atoms and molecules and classify their interactions. (EK 2.A.3, 4.A.1, 4.B.1) | a. You will be able to describe the basic properties of atoms and the subatomic particles within them. |  |  |
| b. You will be able to characterize the interactions **within** molecules (ex: ionic and covalent bonds) that allow them to form molecules. |  |  |
| c. You will be able to characterize the interactions **between** molecules(ex: hydrogen bonds). |  |  |
| Biogeochemical Cycles | 2. You will be able to explain how key atoms are cycled between living organisms and the non-living components of their environment. (EK 2.A.3) | a. You will be able to explain how **carbon** is cycled between living organisms and the non-living components of their environment. |  |  |
| b. You will be able to explain how **water** is cycled between living organisms and the non-living components of their environment. |  |  |
| c. You will be able to explain how **nitrogen** is cycled between living organisms and the non-living components of their environment. |  |  |
| d. You will be able to explain how **phosphorus** and **sulfur** are cycled between living organisms and the non-living components of their environment. |  |  |
| Properties of Water | 3. You will be able to describe how the structural properties of water make it essential to living organisms. (EK 2.A.3) | a. You will be able to explain how the interactions between hydrogen and oxygen make water a polar molecule. |  |  |
| b. You will be able to connect the polarity of water to its ability to act as a solvent in biological solutions. |  |  |
| c. You will be able to connect polarity of water to its ability to hydrogen bond. |  |  |
| d. You will be able to connect the ability of water to hydrogen bond to its resulting properties – cohesion (and surface tension), adhesion, capillary action, high specific heat / heat capacity, and low density as a solid. |  |  |
| Macromolecules | 4. You will be able to connect the structures of the four macromolecules—carbohydrates, lipids, proteins, and nucleic acids— to their unique functions in cells. (EK 4.A.1) | a. You will be able to explain how the structural properties of monomers and polymers for carbohydrates, lipids, proteins, and nucleic acids give these molecules their unique functions within living systems. |  |  |
| b. You will be able to relate the directionality (direction and nature of monomer connections) within carbohydrates, proteins, and nucleic acids to the overall structure and function of these molecules. |  |  |
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| Enzymes | 5. You will be able connect the structure of enzymes to their catalytic function in chemical reactions within living organisms. (EK 4.B.1) | a. You will be able to predict the effect of changes in molecular structure (ex: protein / enzyme denaturation) on function. |  |  |
| b. You will be able to characterize various chemical reactions based on the changes that occur within the reactants (i.e. anabolic vs. catabolic reaction) and the energy lost or gained by the reactants (i.e. exergonic vs. endergonic reaction). You will be able to provide examples of energy coupling between exergonic and endergonic reactions within living organisms. |  |  |
| c. You will be able to discuss the nature and importance of interactions between the substrate and enzyme active site in an enzyme-catalyzed reaction. |  |  |
| d. You will be able to discuss the differences in energy levels for an enzyme-catalyzed vs. non-catalyzed reaction pathway. |  |  |
| e. You will be able to describe how the following factors affect enzyme efficiency – concentration of substrate, concentration of product, pH, and temperature—and determine how to measure the efficiency of enzymes in a laboratory setting. |  |  |
| f. You will be able to predict how allosteric regulators, competitive inhibitors, and coenzymes / cofactors will affect enzyme function. |  |  |