UNIT 2: Chemistry of Life

1. Define and give a biological example for each type of molecular bond (distinguish between strong and weak bonds): polar covalent, nonpolar covalent, ionic, and hydrogen bonds.
2. Describe how the unique chemical and physical properties of water influence life on earth. Include: cohesion, adhesion, high specific heat capacity, universal solvent, heat of vaporization, heat of fusion, thermal conductivity.
3. Describe water’s dissociation and how that affects the pH of a given solution.
4. Identify the 6 major elements found in living things.
5. Describe the role of carbon in molecular diversity, its characteristics, and its forms of organization structures.
6. Define monomer, polymer, hydrolysis, and dehydration synthesis and give specific examples from each of 4 macromolecule groups.
7. Describe the structure and function of proteins. Include: functional groups, how they are formed, examples.
8. Describe the four levels of protein conformation and relate them to denaturation. Explain how the R-group of an amino acid can determine structure and function of that region of the protein (hydrophobic, hydrophilic, ionic, hydrogen bonds, sulfide bonds, etc.).
9. Compare and contrast DNA and RNA. Include: type of sugar, nitrogenous bases, number of strands, monomers, etc.
10. Describe the general structure and function of lipids. Why do they interact with water the way they do?
11. Describe the general structure and function of carbohydrates. Include: monomer, how they are formed, what determines secondary structure, cellulose vs. starch, etc.
12. Describe the 1st and 2nd Law of Thermodynamics.
13. Distinguish between endergonic/exergonic reactions, anabolic/catabolic pathways, kinetic/potential energy, and open/closed systems.
14. Explain energy coupling and give an example.
15. Describe an enzyme in terms of its function in chemical reactions and substrate/product relationships.
16. Define and give examples of the following terms related to enzymes: catalysts, active site, substrate, product, activation energy, induced fit, cofactors and coenzymes, competitive inhibition, noncompetitive inhibition, allosteric site, and feedback inhibition.
17. Explain how changes to the structure of an enzyme may affect its function.
18. Explain how the cellular environment affects enzyme activity.