**Exam 1**

**Study Guide**

1. What is biology?
2. What are seven characteristics shared by all living systems
3. List the hierarchal levels of life from smallest to largest
4. What is the difference between inductive and deductive reasoning. Give an example of each
5. What is a hypothesis and how does it relate to the scientific method
6. What is a scientific theory? Give an example of a scientific theory?
7. How does a scientific theory differ from a hypothesis
8. Describe Darwin’s theory of evolution by natural selection
9. Why does comparing the anatomy of various vertebrate limbs support the theory of evolution?
10. The protein hemoglobin is comprised of various amino acids. Small variations in the amino acid sequence of hemoglobin occur when comparing different species. Would you expect species that are more closely related to have hemoglobin that is more or less similar – or does it not matter? Why?
11. What is an element? What are atoms? What subatomic particles make up atoms?
12. What are valence electrons and why are they important?
13. Distinguish between atomic number and atomic mass.
14. Describe covalent, ionic, and hydrogen bonds as well as Van der Waals interactions. Why are each important?
15. What is electronegativity and how does it influence water?
16. What are the four emergent properties of water and how do they contribute to life on Earth?
17. What is molarity? Be able to calculate molarity as seen in the example problems from the lecture.
18. What is an acid? What is a base? How do buffers neutralize acids and bases?
19. Why does carbon make up the framework of biological macromolecules? More specifically, what properties does it have that make it special?
20. Draw out and label the following functional groups: hydroxyl, carbonyl, carboxyl, amino, sulfhydryl, phosphate, and methyl. Give an example of where each is found.
21. What is an isomer? What is the difference between a structural isomer, a stereoisomer, and enantiomers?
22. What are the four classes of biological macromolecules? Sketch the basic structure of each.
23. Define monomer and polymer.
24. Draw and label the monomer that makes up each of the four types of macromolecules
25. What reaction turns monomers into polymers?
26. What reaction removes monomers from polymers?
27. Describe the structure of a sugar
28. What is the difference between a monosaccharide, disaccharide, and polysaccharide? Give an example of each
29. How are starch and cellulose similar? How are they different?
30. Describe the structure of a nucleotide?
31. Compare and contrast the structures of DNA and RNA. How are they similar, how are they different?
32. What is the function of DNA? The function of RNA?
33. Describe the four levels of protein structure
34. What is the difference between saturated, unsaturated, and polyunsaturated fat?
35. What determines if a lipid will be solid or liquid at room temperature?
36. What are some biological functions of lipids?