**Study Guide #1**

**Human Physiology (BIOL 235)**

1. Discuss Homeostasis in physiology and give specific examples of negative and positive feedback loops.
2. Review chemical bonds and the properties of carbohydrates, lipids, proteins and water for physiology.
3. What is Work? Energy? State the 1st and 2nd Laws of Thermodynamics. Discuss metabolism & reactions.
4. What is an enzyme? What is proteolytic activation of an enzyme? What are coenzymes and cofactors?
5. Discuss names of enzymes. Describe the factors effecting enzyme activity. What is allosteric inhibition?
6. How do [substrate] and [enzyme] affect the *rate* of enzymatically catalyzed chemical reactions?
7. What are the components of the Plasma Membrane? What are the basic roles of these components?
8. Describe 4 functional roles of the Plasma Membrane. Describe diffusion and factors that affect its rate.
9. Compare a protein channel with a protein carrier. Describe their characteristics, what they transport.
10. What are Passive and Active transport mechanisms? List and describe 3 specific examples of each.
11. Define Osmosis, Hypertonic, Isotonic and Hypotonic solutions; and a cell’s response in these solutions.
12. Discuss factors changing the rate of Diffusion. What is Facilitated Diffusion? How does this occur?
13. Define Hydrostatic Pressure (HP) and Filtration. Define Colloid Osmotic Pressure (COP) & Reabsorption?
14. Compare the 3 categories of active transport (1o, 2o, and Vesicular) and describe each in detail.
15. Describe tissue compartment volumes in the body: **1)** plasma **2)** interstitial fluid **3)** intracellular fluid.
16. Define autocrine & paracrine. Compare how the 2 long distance 'Control' systems work in the body.
17. Give an overview of the Nervous System. Compare the Central and Peripheral Nervous Systems.
18. What are the 2 general types of cells in the nervous system? What are their roles?
19. What are the 3 functional types of neurons? Arrange these neurons in a functional response arc (loop).
20. List and briefly describe 6 different types of glial cells and where they are found in the nervous system.
21. What is an Equilibrium Potential? What is an electrochemical gradient? Give examples and values.
22. Compare voltage, ligand (chemical) and mechanically gated ion channels in the body.
23. Which ions use gated channels to cross neuron membranes? Describe voltage gated Na+ ion channels.
24. Compare an Action Potential to a Graded Potential. List at least 6 ways they are different to each other.
25. Describe 3 important factors that contribute to the conductive velocity of an AP along an axon.
26. Compare Temporal and Spatial summation in terms of neuronal signaling.
27. Make a labeled drawing of the synapse, showing the pre- and post-synaptic cell membranes.
28. Discuss the step-wise biochemistry of the synapse. Compare Ionotropic and Metabotropic effects.
29. How is signal transmission stopped? Describe how the synaptic cleft is cleaned up in between signals.
30. What are Excitatory (EPSP's) and Inhibitory (IPSP's) postsynaptic potentials? Describe each of them.
31. Explain the second messenger system using cAMP as a specific example (e.g., metabotropic effect).
32. What is a sensory receptor? Describe different types of sensory receptors discussed in lecture.
33. Using examples described in class, discuss the role of specific endocrine glands in the body.

**Lab Concepts:**

* Enzymes and the reactions they catalyze in the body.
* Cell Membranes and Permeabilities of various molecules.
* Tonicity of Solutions and Osmosis.
* Membrane Voltage, Action Potentials and Neurophysiology Experiments.
* Sensory Receptors, Perception, and Reflexes.