**Study Guide #2**

**Human Physiology (BIOL 235)**

**Central, Autonomic and Somatic Nervous Systems**

1. List the various neurotransmitters discussed in class and briefly describe their general functions.
2. Outline the roles of the 5 lobes of the cerebrum. What is lateralization of the two hemispheres?
3. Describe the important functions of the Diencephalon, Midbrain, Cerebellum, Pons and MO.
4. What is the Autonomic Nervous System and how does it differ from the Somatic Nervous System?
5. Compare the Sympathetic and Parasympathetic divisions of the ANS in terms of their function.
6. Discuss Cholinergic receptors; Adrenergic receptors. Where are they found and what do they affect?

**The Skeletal Muscle System**

1. Describe the characteristics and functions of all muscle tissue, and compare the 3 types of muscle.
2. What’s the role of the sarcoplasmic reticulum (SR)? T- tubules? Lateral sacs? DHP receptors?
3. Draw a sarcomere and include all the important structures (A, I and H bands, the M line and Z discs).
4. What is the sliding filament theory? How do the bands of a sarcomere change during a contraction?
5. Explain in detail the biochemistry of muscle contraction - from the impulse to muscle relaxation.
6. What is the role of ATP in muscle contraction? Myoglobin? Explain how rigor mortis can arise.
7. What is hypertrophy and atrophy of muscle tissue? Compare isometric and isotonic contractions.
8. Describe the sources of ATP for muscle contraction. Compare slow and fast twitch muscle fibers.
9. Explain how the force of skeletal muscle contraction can vary using these three examples: **1)** Temporal summation; **2)** Spatial Summation (motor unit recruitment) and **3)** Length of the resting sarcomere.
10. What affects will botulism, curare and organophosphates have on the neuromuscular junction?

**Cardiovascular System – Blood and the Heart**

1. Describe the various functions and components of blood and discuss the constituents of plasma.
2. What are the lipids in blood? Describe the role LDL’s and HDL’s. Describe how blood glucose changes.
3. Describe how RBCs are specialized for their function: Describe the WBC and platelet cells functions.
4. Discuss blood groups. What is anemia and how can it arise? What are the three steps of hemostasis?
5. Compare the left and right sides of the heart in terms of function, volume and pressure.
6. Trace a RBC through the 2 circuits of the heart. Describe functional syncytium in the heart.
7. Describe the roles of the four (4) valves of the heart. What are some disorders of heart valves?
8. What is an intercalated disc? What are gap junctions? Desmosomes? What are their functions?
9. What is an autorhythmic cell? Describe its characteristics. How many cardiac cells are autorhythmic?
10. Do autorhythmic cardiac cells have RMPs? What is the mV value? Draw a graph of RMP for these cells.
11. Draw a graph of an AP for a contractile myocardiocyte and describe how tetanus is prevented.
12. How does Ca2+ get into cardiac muscle cells? How does this compare with skeletal muscle?
13. How is graded contraction of the heart achieved? Summarize the effects of the ANS on heart activity.
14. Describe the important mechanical events in the phases of the cardiac cycle (one heartbeat).
15. What are EDV, ESV, stroke volume (preload and afterload) & cardiac output? How are they calculated?

**Lab Concepts:**

* Blood Analysis: RBC, WBC and Platelet facts: Properties, functions and lifespan. Blood glucose.
* Blood cell levels (high and low states). Distinguish leukocytosis, leukopenia and leukemia.
* Erythrocyte Sedimentation Rate (ESR) and Hematocrit Testing.
* ABO Blood Grouping: What are the types and the consequences of mixing blood types?