**Study Guide for General Biology I**

**Chapter 4**

***Make Flash Cards:***  It is highly recommended to make flash cards of all vocabulary terms in the chapter and in the lecture notes (PowerPoints).

***Use the following expected student learning outcomes as a guide for studying this chapter…***

**CHAPTER 4: CELL STRUCTURE**

4.1 Cell Theory

* Using metric units, describe the typical size of a eukaryotic cell and a prokaryotic cell.
* Define cell.
* Know who was the first to observe cells.
* State the three principles of the modern cell theory.
* Explain why surface area-to-volume ratio limits the size of cells.
* Define resolution and explain why it is important in microscopy.
* List the four major features all cells have and briefly describe the structure and function of each one.
* Distinguish between cytoplasm and cytosol.

4.2 Prokaryotic Cells

* Draw prokaryotic cell and label its parts. Briefly describe the structure of each part.
* Know which cells have peptidoglycan and know its location in the cell.

4.3 Eukaryotic Cells

* List the differences between prokaryotic and eukaryotic cells.
* Know that plant and animal cells are both eukaryotic, and distinguish between them.
* Define endomembrane system.
* Use Figures 4.6 and 4.7 to learn the names of the structures found in eukaryotic cells. Know which structures are exclusive to plants, and which are exclusive to animals.
* Describe the structure and function of each of the cell components in Figures 4.6 and 4.7. (Note: You will need to utilize the subsequent sections of the chapter to gather this information.)
* Define chromatin.
* Describe the structure of a cell nucleus (entirely different from an “atomic nucleus”!).

4.4 The Endomembrane System

* Identify the components of the endomembrane system and their function(s).
* Using words, trace the path of a phospholipid molecule from the endoplasmic reticulum to the plasma membrane.
* Using words, trace the path of a protein from the endoplasmic reticulum to the extracellular fluid.

4.5 Mitochondria and Chloroplasts: Cellular Generators

* List the structural similarities shared by mitochondria and chloroplasts.
* Explain how the meaning of the word mitochondria differs from the meaning of *mitochondrion*.
* Draw the structure of a mitochondrion and label its parts.
* Draw the structure of a chloroplast and label its parts.
* Describe how mitochondria and chloroplasts arose by *endosymbiosis*.

4.6 The Cytoskeleton

* Name the three types of cytoskeleton fibers.
* Know the function(s) of each type of cytoskeleton fiber.
* Know the types of proteins comprising each type of fiber.
* Know the relative sizes and general structure of each type of fiber.
* Define motor protein.
* Know the function of a motor protein.
* Define vesicle.
* Describe how vesicles can be moved around cells by way of motor proteins and microtubules, using ATP.

4.7 Extracellular Structures and Cell Movement

* Describe what happens when a cell “crawls”.
* Define basal body.
* Describe the structure of a eukaryotic flagellum and how it differs from a prokaryotic flagellum.
* Distinguish between cilia and flagella in terms of structure, number, and movement.
* Explain what is meant by the “9 + 2” structure.
* Know the function and chemical composition of plant cell walls.
* Know the chemical composition of fungal cell walls.
* Know that animal cells do not have cell walls.
* Define extracellular matrix.
* Know that integrin proteins extend through the plasma membrane, connecting the ECM to cytoskeleton fibers.

4.8 Cell-to-Cell Interactions

* Define glycolipid and describe the role of these molecules.
* Define MHC protein and define the role of these molecules.
* Distinguish among the structures and functions of adhesive junctions, tight junctions, and communicating junctions.
* Define desmosome, gap junction, and plasmodesmata.
* Explain how cell junctions can create sheets of cells.

**In addition to the above objectives, also do the following:**

* Accomplish the “Learning Outcomes” in this chapter and be able to do the “Learning Outcomes Review” items.
* Read and look at the information in any “Scientific Thinking” figures for this chapter and be able to use the information to illustrate the classic steps and process of a scientific investigation.
* Know the material in the Chapter Review.
* Do the “Understand” and “Apply” questions in the chapter Review Questions and know *why* the correct answer is the right choice (and *why* the incorrect answers are the wrong choices). Be able to answer similar questions based on any of the above specific learning objectives.