Unit 2 – Cells Learning Objectives

Material may not be covered in the order that it appears here, but all objectives will be accomplished by the end of the unit.

Chapter 7: A tour of the cell

Where we covered it

How We Study Cells

1. Distinguish between magnification and resolving power.
2. Describe the principles, advantages, and limitations of the light microscope, transmission electron microscope, and scanning electron microscope.
3. Describe the major steps of cell fractionation and explain why it is a useful technique.

A Panoramic View of the Cell

4. Distinguish between prokaryotic and eukaryotic cells.
5. Explain why there are both upper and lower limits to cell size.
6. Explain why compartmentalization is important in eukaryotic cells.

The Nucleus and Ribosomes

7. Describe the structure and function of the nucleus and briefly explain how the nucleus controls protein synthesis in the cytoplasm.
8. Describe the structure and function of a eukaryotic ribosome.

The Endomembrane System

9. List the components of the endomembrane system, describe their structures and functions, and summarize the relationships among them.
10. Explain how impaired lysosomal function can cause the symptoms of storage diseases.
11. Describe the different structures and functions of vacuoles.
12. Describe the structure of a mitochondrion and explain the importance of compartmentalization in mitochondrial function.

Evolution, Unity, and Diversity

13. Distinguish among amyloplasts, chromoplasts, and chloroplasts.
14. Identify the three functional compartments of a chloroplast. Explain the importance of compartmentalization in chloroplast function.

Other Membranous Organelles

15. Explain the roles of mitochondria and chloroplasts.
16. Explain the role of peroxisomes in eukaryotic cells.

The Cytoskeleton

17. Describe the functions of the cytoskeleton.
18. Describe the structure, monomers, and functions of microtubules, microfilaments, and intermediate filaments.
19. Explain how the ultrastructure of cilia and flagella relate to their functions.

Cell Surfaces and Junctions

20. Describe the development of plant cell walls.
21. Describe the structure and list four functions of the extracellular matrix in animal cells.
22. Describe the structures of intercellular junctions found in plant and animal cells and relate those structures to their functions.

Chapter 8: Membrane Structure and Function

Where we covered it

Membrane Stucture

1. Describe the properties of phospholipids and their arrangement in cellular membranes.
2. Explain what freeze-fracture techniques reveal about the involvement of proteins in membranes.
3. Describe the fluid properties of the cell membrane and explain how membrane fluidity is influenced by membrane composition.
4. Describe how proteins and carbohydrates are spatially arranged in cell membranes and how they contribute to membrane function.

Traffic across Membranes

5. Describe factors that affect the selective permeability of membranes.
6. Describe the locations and functions of transport proteins.
7. Define diffusion. Explain what causes diffusion and why it is a spontaneous process.

8. Explain what regulates the rate of passive transport.
9. Explain why a concentration gradient across a membrane represents potential energy.
10. Distinguish between hypertonic, hypotonic, and isotonic solutions.
11. Define osmosis and predict the direction of water movement based on differences in solute concentrations.
12. Describe how living cells with and without walls regulate the balance of water content.

Evolution, Unity, and Diversity

13. Explain how transport proteins are similar to enzymes.
14. Explain how transport proteins facilitate diffusion.
15. Explain how active transport differs from diffusion.
16. Explain what mechanism can generate a membrane potential or electrochemical gradient.
17. Describe the process of co-transport.
18. Explain how large molecules are transported across the cell membrane.
19. Compare pinocytosis and receptor-mediated endocytosis.