Module 4: Cells — Keys to Success

Learning Objectives

By the end of this module, you should be able to:

1. State the three principles of cell theory
2. Differentiate between prokaryotic and eukaryotic cells
3. Identify major organelles and describe their functions
4. Trace protein production through the endomembrane system
5. Explain the endosymbiotic theory and its evidence
6. Compare plant and animal cells

Key Terms to Know

- **Cell Theory** — All living things are made of cells; cells are the basic unit of life; cells come from pre-existing cells
- **Prokaryotic Cell** — Simple cell lacking membrane-bound nucleus and organelles (bacteria, archaea)
- **Eukaryotic Cell** — Complex cell with membrane-bound nucleus and organelles
- **Nucleus** — Contains DNA; controls cell activities ("control center")
- **Ribosome** — Site of protein synthesis
- **Endoplasmic Reticulum (ER)** — Rough ER: protein synthesis; Smooth ER: lipid synthesis
- **Golgi Apparatus** — Modifies, packages, and ships proteins
- **Mitochondria** — Cellular respiration; produces ATP ("powerhouse")
- **Chloroplast** — Photosynthesis; found only in plant cells
- **Lysosome** — Digestion and waste removal
- **Central Vacuole** — Storage and support in plant cells
- **Cell Wall** — Rigid outer layer in plant cells
- **Cytoskeleton** — Protein fibers providing structure and movement
- **Plasma Membrane** — Phospholipid bilayer boundary of the cell

Study Tips

1. **Draw and label** diagrams of plant and animal cells
2. **Use the factory analogy** — Match each organelle to a factory department
3. **Create a comparison table** — Prokaryote vs. Eukaryote, Plant vs. Animal
4. **Trace the protein pathway** — Ribosome → Rough ER → Golgi → Vesicle → Membrane
5. **List endosymbiotic evidence** — Double membrane, own DNA, own ribosomes, self-replication