



Dokument bez tytułu - Cell biology

Family law (Islamic University In Uganda Main Campus)



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Cell Biology

1. Overview

Cell biology is the study of cells — the basic structural and functional units of all living organisms. Every living thing, from bacteria to humans, is made of cells that carry out essential life processes.

2. Learning Objectives

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

- Explain what a cell is and why it is considered the basic unit of life.
 - Distinguish between **prokaryotic** and **eukaryotic** cells.
 - Identify major cell structures and describe their functions.
 - Compare **plant** and **animal** cells.
 - Describe how cells obtain energy and maintain homeostasis.
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3. Key Vocabulary

- Cell
- Cell membrane
- Cytoplasm
- Nucleus
- Mitochondria
- Chloroplasts
- Vacuole
- Ribosomes

- Prokaryote
- Eukaryote
- Homeostasis

4. Core Content

A. What Is a Cell?

- Cells are the *smallest units of life* that can perform all life functions.
- Discovered by Robert Hooke in 1665 using a microscope.
- All living organisms are made of one cell (**unicellular**) or many cells (**multicellular**).

B. Prokaryotic vs. Eukaryotic Cells

Feature	Prokaryotic Cells	Eukaryotic Cells
Examples	Bacteria	Plants, animals, fungi, protists
DNA	Free-floating; no nucleus	Enclosed inside a nucleus
Organelles	Few/simple	Many complex organelles
Size	Smaller	Larger

C. Major Cell Organelles and Functions

Organelle	Function
Cell membrane	Controls what enters and leaves the cell
Nucleus	Stores DNA; “control center”
Cytoplasm	Jelly-like fluid where cell processes occur
Mitochondria	Produces energy (cellular respiration)
Ribosomes	Make proteins

Endoplasmic reticulum (ER)	Transports materials; protein and lipid production
Golgi apparatus	Packages and ships proteins
Vacuoles	Storage (water, nutrients, waste)
Chloroplasts (plants only)	Photosynthesis
Cell wall (plants only)	Provides structure and protection

D. Plant vs. Animal Cells

Feature	Plant Cell	Animal Cell
Cell wall	✓ Yes	✗ No
Chloroplasts	✓ Yes	✗ No
Vacuoles	One large central	Many small
Shape	More rectangular	More round/variable

E. How Cells Get Energy

- **Cellular Respiration:**
Glucose + oxygen → energy (ATP)
Happens in mitochondria.
 - **Photosynthesis (plants only):**
Light + CO₂ + water → glucose + oxygen
Happens in chloroplasts.
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5. Activities & Labs

Activity 1: Microscope Observation

- Students observe prepared slides of plant and animal cells.
- Identify nucleus, membrane, cytoplasm, chloroplasts (if present).

Activity 2: Build a Cell Model

- Create 3D or edible models of plant or animal cells.
- Label organelles and explain their functions.

Activity 3: Cell Analogy Project

- Students compare a cell to a system (e.g., city, school, factory).
 - Match each organelle to a real-world role.
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6. Quick Assessment

Multiple Choice

1. Which organelle is known as the “powerhouse of the cell”?
A. Ribosome
B. Golgi apparatus
C. Mitochondrion
D. Vacuole
2. Which type of cell has no nucleus?
A. Plant
B. Animal
C. Prokaryotic
3. Chloroplasts are found in:
A. All cells
B. Plant cells only
C. Animal cells only

Short Answer

4. Explain the difference between a prokaryotic and a eukaryotic cell.
 5. Name three organelles and describe their functions.
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7. Extension Ideas

- Explore cell division (mitosis & meiosis).
- Study specialized cells (neurons, muscle cells, blood cells).
- Look at how viruses interact with cells.