# UNIFYING THEMES OF BIOLOGY

❖ Cell Theory

1. All organisms are made up of one or more cells
2. Cells are the basic unit of structure and function
3. All new cells arise from the division of existing cells

❖ Emergent Properties of Biological Systems

All life exhibits a distinct hierarchical organization, in which small, relatively simple structures combine to form larger, more complex structures:
*Atoms→Molecules→Organelles→Cells→Tissues→Organs→Organ systems→ Organisms→Populations→Species→Communities→Ecosystems→Biosphere*

❖ Structure and Function

Form and function are correlated at all levels of biological organization.

❖ Heredity

All organisms contain DNA, the genetic code of life. Biological information, in the form of genes, is inherited from parents in one generation by the offspring in the next. Heredity works to gradually bring about a change in a species through interactions between individual organisms and their environment—other organisms in their populations, community, ecosystem- over the course of time. Heredity forms the basis for the process of evolution.

❖ Evolution

Evolution, biology's core theme, explains both the unity and diversity of life. The Darwinian theory of natural selection accounts for the adaptation of populations to their environment through the differential reproductive success of varying individuals.

❖ Regulation

To survive and reproduce, all forms of life must regulate their internal and sometimes external environment. Regulation often occurs through feedback mechanisms, in which stimuli increases or decreases a biological response.

❖ Energy Flow

All organisms must perform work, which requires energy. Energy flows from sunlight to producers to consumers.

❖ Interaction With The Environment

Organisms are open systems that exchange materials and energy with their surroundings. An organism's environment includes other organisms as well as nonliving factors.

❖ Unity and Diversity

Biologists group the diversity of life into three domains: Bacteria, Archaea and Eukarya. As diverse as life is, we can also find unity, such as the universal genetic code. The more closely related two species are, the more characteristics they share.