**Chapter Overview**

**Chapter 2: Molecules and Membranes**

Cells are incredibly complex and diverse structures, capable not only of self-replication—the very essence of life—but also of performing a wide range of specialized tasks in multicellular organisms. Yet, cells obey the same laws of chemistry and physics that determine the behavior of nonliving systems. Consequently, modern cell biology seeks to understand cellular processes in terms of chemical and physical reactions.

This chapter considers the chemical composition of cells and the properties of the molecules that are ultimately responsible for all cellular activities. Proteins are given particular emphasis because of their diverse roles within the cell, including acting as enzymes that catalyze almost all biological reactions and serving as key components of cell membranes. Membranes are critical to cell structure and function because they serve as barriers that separate distinct aqueous compartments. For example, the plasma membrane separates the contents of a cell from the external environment, while the nuclear membrane separates the contents of the nucleus from the cytoplasm. Membranes consist of both lipids and proteins and are impermeable to most water-soluble molecules, with proteins carrying out the selective transport of molecules across the phospholipid bilayer.