

*Learning Objectives for Cell Biology***Exam I****Chapter 1 Introduction to Cells**

- Gain an overview of cells and their origin and evolution.
- Learn how microscopy is used to study cells (see Panel 1-1).
- Review the sizes of cells and the limits of resolution of various kinds of microscopy.
- Appreciate the molecular composition of the cytoplasm (see Panel 1-2).
- Distinguish genes and genomes and how each is important to cellular function.

**Chapter 2 Chemical Components of Cells**

- Examine the features of weak and covalent chemical bonds, and the energy associated with each.
- Distinguish polar and nonpolar covalent bonds (Panel 2-1).
- Describe the properties of water and how they influence cellular events (Panel 2-2)
- Review the four kinds of organic molecules in cells and their structures (Panels 2-3 to 2-6).
- Understand the importance of polymers and macromolecules of cell structure and function.

**Chapter 3 Energy and Catalysis**

- Appreciate the importance of free energy considerations for cellular reactions.
- Learn to quantify free energy changes and relate them to chemical equilibrium (Panel 3-1).
- Distinguish  $\Delta G$  and  $\Delta G^\circ$  and understand what each means for chemical reactions.
- Consider how oxidation and reduction reactions are used by the cell.
- Review general enzymatic properties and the concept of activation energy.
- Appreciate  $K_m$  and its use in understanding molecular interactions in a cell.
- Describe how and why ATP is used in cells.
- Understand the significance for cellular energetics of coupled chemical reactions.

**Chapter 13 Cellular Energetics**

- Review the basic organizing principles of metabolism, including the critical position of glycolysis.
- Appreciate how free energy changes are used to organize glycolytic reactions (Panel 13-1).
- Examine gluconeogenesis and fermentation.
- Outline beta-oxidation and fatty acid metabolism.
- Recognize the contributions of CAC and electron transport to the production of ATP (Panel 13-2).

READING AND PROBLEM ASSIGNMENTS  
*Essential Cell Biology, Alberts et al., 4th edition*

<u>Chapter: Pages</u>	<u>Problems</u>
1: 1-36	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 17, 19, 20
2: 39-79	2, 3, 4, 7, 8, 9, 10, 14, 15, 16, 18, 19, 20, 21
3: 83-116	1, 2, 3, 6, 8, 9, 10, 12, 13, 15, 18, 19, 20, 22
13: 419-444	1, 3, 4, 5, 6, 7, 11, 14, 16