

King Saud University
College of Science
Biochemistry Department

Bioenergetics (BCH 441)

Objectives:

At the end of the course, the students will be able to:

- Define bioenergetics
- State the laws of chemical thermodynamics
- Describe the mechanisms of energy coupling
- Understand the role of energy in regulating catabolic and anabolic pathways.
- Describe the mechanisms that explain the high-energy character of high-energy compounds.
- Describe the process of synthesis of ATP by chemiosmosis
- Explain the thermodynamics of oxidation-reduction reactions and describe the component of electron transport chain (ETC).
- Describe the basic features of chloroplast that facilitate its role in photosynthesis and describe the light reactions of photosynthesis .

Reference Books:

- **Principles of Biochemistry (Lehninger)** by DL. Nelson and MI. Cox (latest edition).

Topics
Bioenergetics : Introduction and definitions
Introduction and definitions. Energy, work, types of energy interconversion, equivalence, equilibrium, efficiency the cell as a thermodynamic system
Introduction to thermodynamics
Adenosine triphosphate (ATP) and phosphorylated compounds
Energetics of carbohydrate and lipid metabolism
Respiratory electron transport system and oxidative phosphorylation
Photosynthesis
Transport across biomembranes: free energy