Structure and Function

- **Anatomy**
  - Describes the **structures** of the body
    - What they are made of
    - Where they are located
    - Associated structures

- **Physiology**
  - Is the study of
    - Functions of anatomical structures
    - Individual and cooperative functions
Anatomy and Physiology Integrated

- Anatomy
  - **Gross anatomy**, or macroscopic anatomy, examines large, visible structures
    - *Surface anatomy*: exterior features
    - *Regional anatomy*: body areas
    - *Systemic anatomy*: groups of organs working together
    - *Developmental anatomy*: from conception to death
    - *Clinical anatomy*: medical specialties
Anatomy and Physiology Integrated

- **Anatomy**
  - **Microscopic anatomy** examines cells and molecules
    - *Cytology*: study of cells and their structures
      - cyt- = cell
    - *Histology*: study of tissues and their structures
Anatomy and Physiology Integrated

- Physiology
  - **Cell physiology**: processes within and between cells
  - **Special physiology**: functions of specific organs
  - **Systemic physiology**: functions of an organ system
  - **Pathological physiology**: effects of diseases

Copyright © 2009 Pearson Education, Inc., publishing as Pearson Benjamin Cummings
Levels of Organization

- **The Chemical (or Molecular) Level**
  - Atoms are the smallest chemical units
  - Molecules are a group of atoms working together

- **The Cellular Level**
  - Cells are a group of atoms, molecules, and organelles working together

- **The Tissue Level**
  - Tissues are a group of similar cells working together

- **The Organ Level**
  - An organ is a group of different tissues working together
Levels of Organization

- **The Organ System Level**
  - Organ systems are a group of organs working together
  - Humans have 11 organ systems

- **The Organism Level**
  - A human is an organism
Anatomical Terminology

- **Superficial Anatomy**
  - **Anatomical position**: hands at sides, palms forward
  - **Supine**: lying down, face up
  - **Prone**: lying down, face down
Anatomical Terminology

- Superficial Anatomy
  - Anatomical Landmarks
    - References to palpable structures
  - Anatomical Regions
    - Body regions
    - Abdominopelvic quadrants
    - Abdominopelvic regions
  - Anatomical Directions
    - Reference terms based on subject
Sectional Anatomy

Planes and sections

- **Plane**: a three-dimensional axis
- **Section**: a slice parallel to a plane

Used to visualize internal organization and structure

Important in radiological techniques
- MRI
- PET
- CT
Body Cavities

- Body cavities have two essential functions
  - Protect organs from accidental shocks
  - Permit changes in size and shape of internal organs

- Ventral body cavity (*coelom*)
  - Divided by the **diaphragm**:
    - Thoracic cavity
    - Abdominopelvic cavity
The Thoracic Cavity

- Separated into regions
  - Right and left pleural cavities
    - contain right and left lungs
  - Mediastinum
    - upper portion filled with blood vessels, trachea, esophagus, and thymus
    - lower portion contains pericardial cavity
      - the heart is located within the pericardial cavity
Body Cavities

- The Abdominopelvic Cavity
  - Peritoneal cavity — chamber within abdominopelvic cavity
    - *Parietal peritoneum* lines the internal body wall
    - *Visceral peritoneum* covers the organs
The Abdominopelvic Cavity

- Abdominal cavity — superior portion
  - Diaphragm to top of pelvic bones
  - Contains digestive organs
- Retroperitoneal space
  - Area posterior to peritoneum and anterior to muscular body wall
  - Contains pancreas, kidneys, ureters, and parts of the digestive tract
The Abdominopelvic Cavity

- Pelvic cavity — inferior portion
  - Within pelvic bones
  - Contains reproductive organs, rectum, and bladder