Chapter 1
Lecture Outlines*

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.
Biological Science 15: Survey of Human Anatomy and Physiology
Spring 2009    Monday and Wednesday 8:45 – 10:50    LS101
Instructor: John Crocker    phone (408) 852-2835    Email: jcrocker@gavilan.edu
Office: LS117    Office Hours: Wednesday 11:00-12:00 or by appointment

Required Texts:
Hole's Essentials of Human Anatomy and Physiology
Hole's Essentials of Human Anatomy and Physiology Lab Manual
McKenna, Supplement for Biology 15

Supplemental Texts / Materials:
Study Guide for Hole's Essentials of A &P
Rust, A Guide to Anatomy and Physiology
McMinn, Color Atlas of Human Anatomy
Coloring Atlas for A&P
Netter's Anatomy Flashcards
Permacharts (or other brand plastic study sheets)

• Muscular Attachments.
• Skeletal System,
• Nervous System, Articulations
Expected Course Learning Outcomes

1. Identify selected structures of the human body

2. List the organ systems of the human body and explain their functions

3. Relate the structures of the human body to their functions.

4. Develop basic laboratory and dissection, skills which can be utilized in further investigations.

5. Apply knowledge of structure and function learned at one level or system to other levels or systems.

- Measure: written exam, homework, lab reports
## Grading Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (%)</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture (~67%)</td>
<td></td>
<td>4 exams at 100 points each</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Homework</td>
<td>~50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final Exam</td>
<td>100</td>
</tr>
<tr>
<td>Laboratory (~33%)</td>
<td></td>
<td>Lab reports</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab Quizzes</td>
<td>~80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab Final</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>~830</td>
</tr>
</tbody>
</table>

**Grading Scale:**

- **A** = 90% and up (A- = 89.5)
- **B** = 80-89% (B+ = 87; B- = 79.5)
- **C** = 70-79% (C+ = 77)
- **D** = 60-69%
- **F** = less than 60%

**Withdrawal Policies:**

- **NRS** = withdrawal during weeks 1-5
- **W** = withdrawal during weeks 6-14
- **F** = failure to notify instructor of withdrawal or withdrawal after week 14
- **I** = incomplete (for unforeseen and justifiable reasons, or emergency; may be granted only after week 14)
• **Special Concerns:**

Students with special needs such as hearing and/or vision impairment should make arrangements with the instructor.

• **ADA Accommodation Statement:**

Students requiring special services or arrangements because of hearing, visual or other disability should contact their instructor, counselor, or the disabled Student Service Office.
• Official note takers are needed
• Please contact Mr. Crocker after class if you are interested
Initial Quiz

1. Define the terms Anatomy and Physiology.
2. List the levels of organization of the Human Body from least complex to most complex (minimum of 7 levels).
3. What characteristics are shared by all living organisms?
4. List the three primary building blocks of atoms?
5. What are the two types of cell division and what is the primary difference between them?
6. Name 2 functions of skin.
7. Name at least 3 functions of the skeleton.
8. List the 3 types of muscle.
9. List the 3 types of blood cells and their primary function.
10. Where and how does digestion begin?
Chapter 1
Introduction to Human Anatomy and Physiology
Introduction:

• The early students of anatomy and physiology were most likely concerned with treating illnesses and injuries.

• Early healers relied on superstitions and magic. Later, herbs were used to treat certain ailments.

• Eventually, after much controversy the study of medicine with standardized terms in Greek and Latin began.
Anatomy and Physiology

• **Anatomy** deals with the structure (morphology) of the body and its parts; in other words, what are things called?

• **Physiology** studies the functions of these parts or asks the question, “how do they work?”

• The two disciplines are closely interrelated because the functional role of a part depends on how it is constructed.
• Anatomists rely on observation and dissection, while physiologists employ experimentation.

• It is more common to discover new information about physiology but anatomical discoveries are being made as well.
Levels of Organization:

- Atom
- Molecule
- Macromolecule
- Organelle
- Cell
- Tissue
- Organ
- Organ system
- Organism
Levels of Organization:

The human body is the sum of its parts and these parts can be studied at a variety of levels of organization.

1. **Atoms** are the simplest level.
2. Two or more atoms comprise a **molecule**.
3. **Macromolecules** are large, biologically important molecules inside cells.
4. **Organelles** are aggregates of macromolecules used to carry out a specific function in the cell.
Levels of Organization Continued:

5. **Cells** are the basic living unit.

6. **Tissues** are groups of cells functioning together.

7. Groups of tissues form **organs**.

8. Groups of organs function together as **organ systems**.

9. Organ systems functioning together make up an **organism**.
Characteristics of Life

- Fundamental characteristics of life are traits shared by all organisms.
Characteristics of life include:

1. Movement (internal or gross)
2. Responsiveness (reaction to internal or external change)
3. Growth (increase in size without change in shape)
4. Reproduction (new organisms or new cells)
5. Respiration (use of oxygen; removal of CO₂)

Table 1.1
6. *Digestion* (breakdown of food into simpler forms)

7. *Absorption* (movement of substances through membranes and into fluids)

8. *Circulation* (movement within body fluids)

9. *Assimilation* (changing nutrients into chemically different forms)

10. *Excretion* (removal of metabolic wastes)

- Taken together, these 10 characteristics constitute *metabolism*. 
Maintenance of Life

Requirements of Organisms:

- Life depends on the availability of the following:
  - a. Water
  - b. Food
  - c. Oxygen
  - d. Heat
  - e. Pressure

- Both the quality and quantity of these factors are important.
**Homeostasis:**

- Maintenance of a stable internal environment is called **homeostasis**.
- Homeostasis is regulated through control systems which have receptors, a set point and effectors in common.

**Examples include:**

a. Homeostatic mechanisms regulate body temperature in a manner similar to the functioning of a home heating thermostat.

b. Another homeostatic mechanism employs pressure-sensitive receptors to regulate blood pressure.
Many of the body's homeostatic controls are **negative feedback** mechanisms.

Each individual uses homeostatic mechanisms to keep body levels within a normal range; normal ranges can vary from one individual to the next.
Organization of the Human Body

- Major features of the human body include its cavities, membranes, and organ systems.
Body Cavities:

- The body can be divided into an **appendicular** portion (upper and lower limbs) and an **axial** portion (head, neck, and trunk), which includes a **dorsal** and a **ventral** cavity. Organs within these cavities are called **viscera**.
a. The dorsal cavity can be divided into two areas:

1) Cranial cavity
2) Vertebral canal

b. The ventral cavity is made up of the following:

1) Thoracic cavity
   - The mediastinum divides the thorax into right and left halves.
2) Abdominopelvic cavity
   - The abdominopelvic cavity can be divided into the abdominal cavity and the pelvic cavity.

- A broad, thin muscle called the diaphragm separates the thoracic and abdominopelvic cavities.
c. Smaller cavities within the head include the oral cavity, nasal cavity, orbital cavities, and middle ear cavities.
Thoracic and Abdominopelvic Membranes:

1. The thoracic cavity is lined with pleural membranes; the parietal pleura lines the cavities while the visceral pleura covers the lungs. A thin layer of serous fluid separates the two layers.

2. The heart is surrounded by pericardial membranes. The parietal pericardium makes up an outer sac and the visceral pericardium covers the heart. Serous fluid separates the two layers.

3. Peritoneal membranes line the abdominopelvic cavity; a parietal peritoneum lines the wall while visceral peritoneum covers the organs.
Thoracic and Abdominopelvic Membranes
Organ Systems

• **Body Covering**
  
a. The *integumentary* system, including skin, hair, nails, and various glands, covers the body, senses changes outside the body, and helps regulate body temperature.
• **Support and Movement**

a. The *skeletal* system is made up of bones and ligaments. It supports, protects, provides frameworks, stores inorganic salts, and houses blood-forming tissues.

b. The *muscular* system consists of the muscles that provide body movement, posture, and body heat.
• *Integration and Coordination*

a. The *nervous* system consists of the brain, spinal cord, nerves, and sense organs. It integrates incoming information from receptors and sends impulses to muscles and glands.

b. The *endocrine* system, including all of the glands that secrete hormones, helps to integrate metabolic functions.
• **Transport**

  a. The *cardiovascular* system, made up of the heart and blood vessels, distributes oxygen and nutrients throughout the body while removing wastes from the cells.

  b. The *lymphatic* system, consisting of lymphatic vessels, lymph nodes, thymus, and spleen, drains excess tissue fluid and includes cells of immunity.
• **Absorption and Excretion**

a. The *digestive* system is made up of the mouth, esophagus, stomach, intestines, and accessory organs. It receives, breaks down, and absorbs nutrients.

b. The *respiratory* system exchanges gases between the blood and air and is made up of the lungs and passageways.

c. The *urinary* system, consisting of the kidneys, ureters, bladder, and urethra, removes wastes from the blood and helps to maintain water and electrolyte balance.
• **Reproduction**

a. The **reproductive** system produces new organisms.

   i. The male reproductive system consists of the testes, accessory organs, and vessels that conduct sperm to the penis.

   ii. The female reproductive system consists of ovaries, uterine tubes, uterus, vagina, and external genitalia. The female reproductive system also houses the developing offspring.
Anatomical Terminology

• Relative Positions:

1. Terms of relative position describe the location of one body part with respect to another.

2. Terms of relative position include:
   - superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial (peripheral), and deep.
Body Sections:

1. A **sagittal** section divides the body into right and left portions.

2. A **transverse** section divides the body into superior and inferior portions. It is often called a “cross section”.

3. A **coronal** section divides the body into anterior and posterior sections.
Body Regions

1. The abdominal area can be divided into nine regions.

2. Terms used to refer to various body regions are depicted in Fig. 1.16.